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# BBC ACORN USER

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# BBC ACORN USER

ISSUE NO 82 — MAY 1989


## COVER






Cover by Paul Allen

## EDITORIAL

**How often have you, with your model B, tried to get data out of one program into another? If it's a 20k screen from a drawing program, or perhaps just text then it may be possible. But more complex interworking is rare on the 8-bit machines. At BBC Acorn User we've tried to ease this, with explanatory articles and even January's poster on file transfer.**

**But file transfer is much more important with the Arc – in fact Risc OS encourages it. No single program can do everything, so the idea is to use sets of programs together. To make this work, software writers must get it clear: it's vital that you can swap data with other programs easily. After the desktop itself, this is the biggest step from Beeb to Arc.**

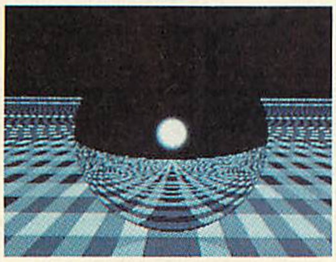
**This is my last month as editor – I'm moving on to make DTP work at Redwood Publishing. Good luck to Geoff Bains who's taking over.**

## NEWS

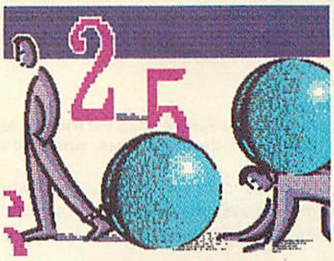


## FEATURES











## REVIEWS











## SURVEY



## REGULARS



## NEXT MONTH



An introduction to PostScript and the Qume Crystal Print Publisher, the more affordable PostScript printer. What are the best databases for education? Plus all your favourites – News, Agora and Hints and Tips.


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We feel this is one of the best, low cost, additions we have produced for the Electron & +1 user, especially for Plus 3, AP3, ABR & AP7 users now with this easy to fit upgrade you can add:

1) Fix for Tape filling system in Hi-res screen modes. 2) * ROMS- displays ROM/ROM images present. 3) * UNPLUG disable ROM/RAM image. 4) * INSERT - enables or inserts a previously unplugged ROM. 5) * KILL - totally disables the Plus 1. 6) * LOCK - locks a sideways RAM bank in ABR, AQR, AP7 7) * LROMS - locks all sideways RAM banks found. 8) * UNLOCK - to unlock a sideways RAM bank in ABR, AQR, AP7 9) * UROMS - to unlock all sideways RAM banks found. 10) * SAVEROM - saves a ROM image to current filing system. 11) * LOADROM - loads a ROM image from current FS into a RAM bank. 12) * FORMAT - will format an ADFS disc for Plus 3 or AP3. 13) * VERIFY - tests every sector on an ADFS disc. 14) * VFORM - formats and verifies an ADFS disc in one command. 15) * BUILD - creates a text file that can be used by *EXEC (ie !BOOT). 16) * LIST - displays a numbered listing of a text file 17) * TYPE - displays a file on screen with no line numbers. 18) * DUMP - to view a file's contents on screen. 19) * LANG - selects a default language to be booted on (CTRL-BREAK) 20) * HELP - provides a full 'help' list on all the ROM's commands. 21) * AQRPAGE - selects specified page in AQR.

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The AP2 is the definitive Plus1 ROM. . . . .I'm not sure what i'd do without it. . . . .like all of PRES's other products, it's been well worth waiting for" July '88

### FILING SYSTEMS

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Suitable for existing Plus 3 or A.P.4 users. This new version has the software fixes for Zysyshelp, write protect disable & compaction. Also Winchester code has been replaced with the necessary driving software to handle AQR as a 256k RAM DISC. Please note - ADFS is Acorns adopted standard filing system supplied on the Plus 3, Master 128, Master Compact & now the Archimedes. Supplied on 16k ROM with Welcome disc & utilities. Please state 3.5/5.25 welcome disk.

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For Electron users with either Plus 3 or A.P.4 and 32k of S/W RAM i.e. ABR. All the benefits of ADFS but without all the loss of RAM! Includes all the software 'fixes' call for managing the new & original ADFS. One of the most frequent question we are asked: "How do I get back the memory lost on my Plus 3 system?" Answer: PRES ADFS & EOO regains 3.75k leaving page @ &EOO the same as Tape!
ADFS EOO supplied; 3.5 ADFS (manual available separately)

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5.25 DFS(2 discs + ADFS manual) **£19.00 ex VAT; £21.85 inc VAT**
**(See Special Package Prices)**

### DISC INTERFACES (Plus One required)

**AP3 INTERFACE:** As supplied with AP3 package. A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 80T drive with PSU. It runs Acorn's ADFS (as supplied on Acorn Plus Three, Master 128, Master Compact and now the Archimedes) supplied with A.D.F.S. manual and welcome disc + Utilities and 3 bonus games (please specify 3.5 or 5.25 80T format). Also provides a spare 16K rom socket. **Price £52.00 ex VAT £59.80 inc VAT**

**AP4 INTERFACE:** A fully Acorn compatible disc interface that will accept any standard 5.25 or 3.5 drive with PSU. It runs the 1770 DFS (as fitted in the BBC 'B' and Master) keeps pace at &EOO - has utilities in rom and provides a spare 16K rom socket (DFS manual included. **Price £60.83 ex VAT £69.95 inc VAT**

**AP34 INTERFACE:** Get the best of both filing systems. Now available from PRES the ultimate interface. Fitted with both Acorn approved filing systems. . .Acorn's current standard ADFS and Acorn 1770 DFS (which can be run at &EOO) ADFS and DFS manuals supplied + ADGFS welcome disc with utilities.
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### SOFTWARE PRODUCTS

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All 3.25 ADFS £6.95 ex VAT £7.99 inc VAT each disc

**Advanced Games Compendiums - on disc** with so many of our products providing more 'serious' add-ons for the Elk; we thought it was time to allow easy Access to some of the favourite games ON DISC! . . . Three volumes of popular games, previously only available on tape, now 'instantly' loadable from menu on disc. Titles such as Croaker, Felix & Fruit Monsters, Killer Gorilla, Danger UXB, Swoop, Ghouls, Invaders, Swag, Galactic Commander, Felix in the Factory, Bumble Bee, Gauntlet, Frenzy, Moonraider, Positron etc. etc.. Each volume contains EIGHT menu selectable games.
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| AP7 + 5.25" ADFS E00 | £48.65 ex VAT | £55.95 inc VAT |
| AP7 + 5.25" DFS (ADFS E00) | £52.13 ex VAT | £59.95 inc VAT |
| AP4 + CS400 | £147.78 ex VAT | £169.95 inc VAT |
| AP1 + AP4 + CS400 | £189.00 ex VAT | £217.35 inc VAT |

### ********** ACCESSORIES **********

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|---|---|---|
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| **Plus 3 2nd drive adaptor** converts the fitting at the back of the original drive which has been configured to Drive 1. | £6.91 | £7.95 |
| **AP3 2nd drive lead** replaces existing drive cable with one containing an extra connector for adding a second drive configured as Drive 1. | £5.96 | £6.85 |
| **Electron Advanced Users Guide** | | £3.95 |
| **ADFS Guide Manual** | | £5.00 |
| **DISCS 3.5 10 in plastic library box** | | £19.95 |
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# NEWS

## BBC software sets sail



**Armada souvenirs**

The Antrim-based Area Resource Centre in Northern Ireland has marked the 400th anniversary of the Armada battle when Spain tried to invade England with a history resources and teaching pack for the BBC B, B+ and Master.

Its *Armada IT History Resources Pack* concentrates on Ireland's involvement in the battle with computer programs, databases and slides of objects found in the wrecked ships and contemporary maps.

Cleverly combining computers and history teaching, the package allows pupils to relive the battle by checking gunpowder and ship supplies in detailed simulations.

Well produced and extensive manuals and books of background history are provided as part of the sumptuous package. It is being distributed by Computeach, price £89.25

## Double vision

Epson has added a new dimension to dot-matrix printing with the first 48-pin printer. Launched at the Which Computer? Show in February, the new TLQ4800 provides a draft speed of 250cps, two letter quality fonts, an advanced operator panel and a range of type styles.

However, the first 48-pin dot-matrix printer is more than twice as expensive as 24-pin models, priced at £2528.85.

# Acorn announces Unix on Econet

Acorn is promoting its R140 Unix workstation to schools by offering them a very special deal – a complete system including the SIMS and Script schools management software to local education authorities for £2695 each.

Each LEA can buy up to 10 at this special price, and the offer is open until the end of this year.

The software has been specially ported to the R140 to maximise its performance. The computers can be linked through Ethernet networks to local authority mainframes, and through Econet to existing school networks of Acorn machines. The system also includes the Archimedes Risc OS operating system, and the MS-DOS emulator.

■ The *Ecoterm* package from Cambridge Systems design is available to allow Masters to act as multiple terminals to the Unix system through Econet, so schools can introduce business software to their pupils without having to invest in extra hardware.

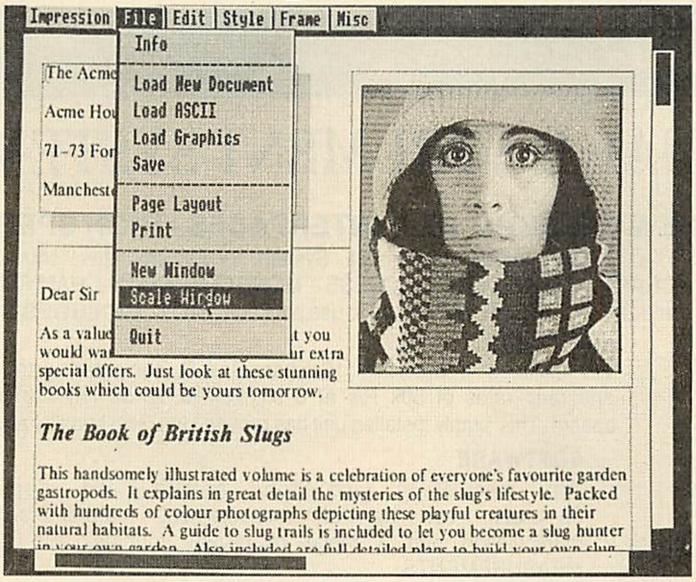
Christopher Parpington of Cambridge Systems Design, which developed the program, explained 'It seemed such a waste to have a multi-user box like the R140 and not take full advantage of it. Our software allows all BBC machines to use the R140 as if it were a file-server, without any additional hardware, and to run Unix programs.'

Users simply log on to the R140 as if it were a normal file server. To do this you simply type *I am Unix. The micro then becomes a terminal.

However programs relying on the X-Windows graphical interface won't run because the older micros can't handle the graphics. However CSD has run the SIMS administration package and expects other Unix packages to run just as well. Prices are yet to be announced.

■ Another Cambridge company, SJ Research, has already introduced a system which allows powerful PCs with 80386 chips to run Unix and MS-DOS software on Econets in a similar fashion.

## First Impressions




Computer Concepts is set to make an impression on the Archimedes software market with its combined wordprocessor and desktop publishing program – *Impression.* Priced at around £150 and available in June, *Impression* allows users to write text and print it out in style without having to transfer files between programs. Computer Concepts is calling it a document processor, because it can produce a printed document from start to finish. Features include a selection of fonts and text which can flow from page to page without having to create new files, *Impression* was first demonstrated at the *Which Computer?* Show in Birmingham in February.

Computer Concepts has also just launched a document scanning package, consisting of software, a scanner and an expansion card. *Scanlight* is available now for £516.35.

## Topologika takes control

*Stock Pack plc* by Topologika in conjunction with EARO is designed to facilitate learning about stock control, invoicing and accounts. It allows users to set up a system to run an imaginary business without the need for knowledge of accounting or computer programming.

The system will allow up to 450 products to be monitored with accounts for up to 250 customers. Invoices may be printed, debtors pinpointed and stock checked as the system develops. *Stock Pack plc* costs £24.95.

## Therapy meeting

The Occupational Therapists' Special Interest Group in Microcomputers is holding its 5th annual conference at the University of Exeter on the 12-14 April 1989. Lectures and seminars will cover the use of the new technology to help train staff in the care of cancer patients at home, the use of expert systems and computers in assessment of children. Details from Delegate Administration, c/o Rae Owen, 28 Ravenscroft, Ridings Mead, Salisbury SP1 8DL.

## By the book

Blackwell Scientific Publications has released a book on Computer Assisted Language Learning (CALL) by Keith Cameron, head of French department Exeter University. The book reviews the practical issues surrounding CALL and contains reports on specific systems.

## Z88 price cut

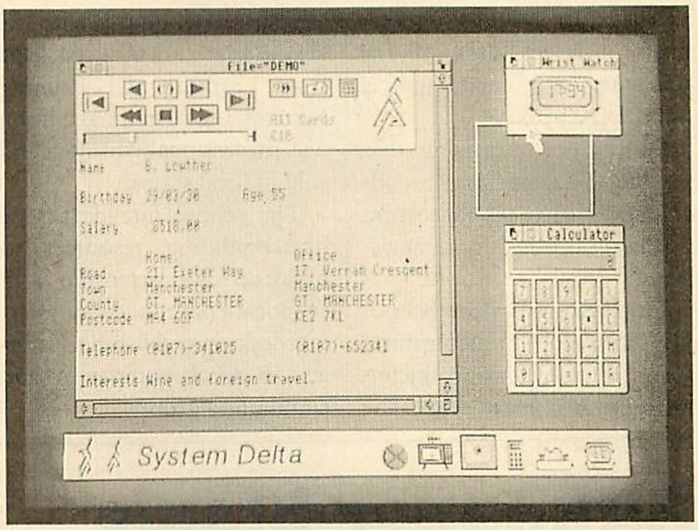
Cambridge Computer has reduced the price of the all-in-one version of its Z88 portable BBC Basic computer to £230, a cut of £57.

# Disc scheme aims to free programs

Software piracy is becoming a bigger issue with increasing cost, both to developers and consumers, of programs. To prevent unauthorised copying, software publishers protect the discs, so anyone who wants to use the program has to buy their own copy.

The problem is that protection makes a program less useful; it can't be transferred to a hard disc and copies can't be made for every micro in a classroom. Educational publishers are aware of this and are formulating a scheme to compensate them for the sales they would lose if they removed copy protection.

'There's a real need in schools to be able to copy programs, but there's a real risk to publishers as well,' said Ysanne Heald of ESM software. Umbrella organisation, the Educational Software Publishers' Association is holding meetings with the National Council for Educational Technology. They are proposing that a £4 million fund be set up by the DES or local education authorities, similar to that which compensates book publishers for sales lost through photocopying.




*System Delta Plus* not for copying

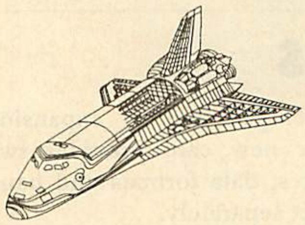
But the publishers are not confident that educationalists' are willing to pay that much. 'The problem is that people don't like paying for software,' said one publisher. ESM reckons that to issue unprotected discs without a compensation fund it would have to raise prices by 400 per cent.

■ One Archimedes user's attempts to bust protection on Minerva's *System Delta Plus* has failed. Rev Stuart Bell from Brighton broke the protection and offered other users the program through the Archimedes newsletter *Archive*.

Minerva pointed out that an unprotected version is available for £120 extra and the £200 total price compares well with unprotected PC packages costing £500 or more. If we release software for the Archimedes at BBC prices we have to protect it,' Minerva said. After discussion with Minerva's solicitors *Archive* has now stopped distributing the program.

## Crystal images

A new PostScript printer from Qume provides an alternative to laser printers. The Crystalprint Publisher uses liquid crystal shutters instead of a laser beam and is the third in a series of similar printers (the Crystalprint WP and Series II) from Qume, but first to adhere to the Postscript standard. With 3Mb of memory and 11 built-in fonts it is aimed at DTP applications.



Crystal clear Qume

The Crystalprint Publisher is available now, price £3449. Details from Qume Tel: (0635) 523200.

## Computer PAL

The Archimedes can be used to develop and produce programmable logic array chips with a new device from Atomwide. The PAL programmer consists of an expansion card, external programming socket and power supply. The software accepts logic equations and JEDEC files and will also work with PAL software run under the MS-DOS emulator. The entire package costs £199.

# School press day on film

Putting together a school newspaper is one of the most exciting uses of technology in schools. It brings together many different uses of the computer and encourages a wide range of skills.

So it's not surprising that the *BBC Software Show*, broadcast on April 2, should feature a school producing a newspaper.

Pupils from Aveland School in Sleaford, Lincolnshire, spent the whole day producing the *Aveland Arrow* while the cameras watched. The children were helped by a range of computers – Arcs included – which were equipped with the *Newsmaster* DTP package from Learning and Training Systems Ltd. The final edition was professionally printed and sold in local shops.

The school intends to use its computing resources to build up its relationship with the local community by offering desktop publishing facilities to local companies and community groups.



**Newsday proved busy at Aveland School.**

# Bitbopper blows disco goers minds

Imagine a disco with the music enhanced by a 'mind-blowing' lightshow, video walls and other special effects. Hardly the most likely home for the Archimedes, but it will be if the Bitbopper from Tecnation is as successful as developer Alex Blok hopes it will be.

The Bitbopper uses two linked Archimedes 440s with video digitisers, genlock cards to synchronise video input and output, and MIDI interfaces to arrange all the effects. 'One Archimedes is the emission controller, and contains the user interface, and the other contains the genlock and so on,' explained Blok. 'We decided to use the Archimedes because it's the fastest computer around,' Blok added. 'And Acorn has been fantastic in its support for our project.'

Tecnation is now demonstrating the first prototype Bitbopper to companies interested in marketing it. Blok hopes it will be sold all over the world and compete with systems from internationally known companies such as Fairlight.

## Series of serials

**Intelligent Interfaces has developed another expansion card for the Archimedes. The new card provides two additional RS423 serial interfaces; data formats and baud rates (from 75 to 19200) can be set separately.**

**Each port has the same pin assignment as the standard serial port on the Archimedes, and ROM software on the card allows the operating system to recognise the extra ports. With four cards up to eight serial connections can be made to the machine. Each card costs £224.25 from Intelligent Interfaces.**

## CUSTOMER HOTLINE

■ Continuing the practice of revealing more application notes from the hidden depths of Customer Support, a couple of golden oldies this month! The first is numbered 0040031 and details the differences between Basic I and Basic II. The second is numbered 0190031 and details the differences between Basic II and Basic IV.

As usual, they can be obtained on request from Customer Support or downloaded from the Support Information Database.

■ As I mentioned a couple of months ago, the success of our support strategy is very important to us at Acorn and we rely on our dealers helping us in our endeavours. This is why they get telephone hotline support from us to answer any queries you may pose to them.

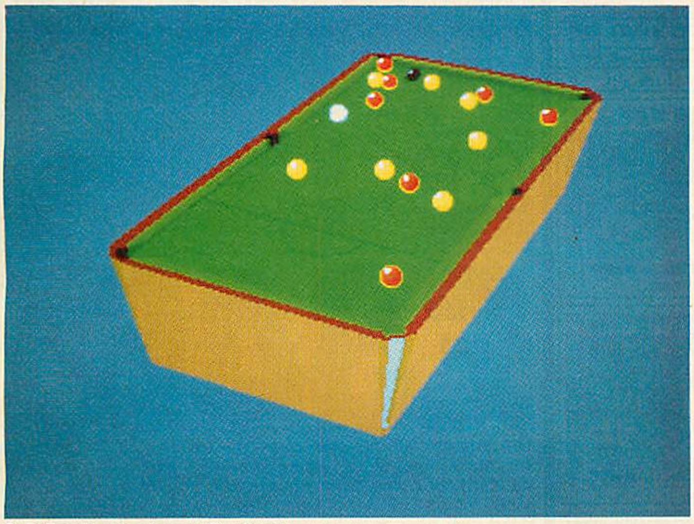
So, if you go to a dealer and get less than satisfactory support from them, please let us know by letter at the normal address. Of course, if you want to praise the service you get from a dealer, let us know too!

■ Educationalists with level 3 file servers, who are running software with a version number less than 1.06, can receive upgrades free of charge by sending the utilities disc in to Customer Support.

■ Just a reminder about writing to Customer Support. To ensure the mail reaches us as quickly as possible, the proper address is Customer Support, Acorn Computers Limited, Fulbourn Road, Cherry Hinton, Cambridge, CB1 4JN.

■ If you want to find out more about Acorn's Support Information Database, try the guest system on (0223) 243642. You will need viewdata terminal software set to 1200 baud receive, 75 baud transmit, 7 data bits and even parity. The cost of becoming a registered user is 8p plus VAT per minute with no subscription but a minimum charge of £10 per quarter. Payment is made by direct debit with an initial trial period of up to three months (depending on when you start) for which there is no minimum charge.

# BT sells off its games house



***3-D Pool* is the latest Firebird game**

British Telecom is selling its successful games software company Telecomsoft, because it doesn't fit in with BT's business-like image.

British Telecom set up the company believing that games software would be sold by phone and modem links, rather than on disc and cassette. However as this now seems unlikely to happen it has decided to sell.

Telecomsoft general manager Paula Byrne was initially hoping to arrange a management buyout, but is now holding talks with interested purchasers.

'I'm hoping that we will be bought lock, stock and barrel, without disruption to our program of releases,' she said. 'When you look at our catalogue of current and forthcoming releases, you'll see that whoever buys us will be very lucky.'

The company's three software labels Rainbird, Firebird and Silverbird have won prizes for games like *Virus*, the ST and Amiga version of *Zarch*. It is one of the few games companies to maintain a commitment to both BBC micros and the Archimedes, with Arc versions of its Magnetic Scrolls adventures regularly receiving good reviews.

# Video production tool

Interactive Media Resources intends to reap the benefits of the home video production boom with its new series of PAL encoders for the Acorn Master. The Datavid-M PAL encoder, which accepts RGB as produced by the computer input, can record computer display on to videotape and incorporate bar charts and animations produced by the computer into video productions. It also claims to provide better quality video signals than you'd find on an ordinary video recorder. Complete with a power supply unit it costs £179.99. A version is also available for the Archimedes.

## THE COMMS COLUMN

■ The main story this month is that British Telecom's Vasscom network is at long last fully active throughout the UK, meaning that all Prestel numbers can be accessed at 300/300 baud (V21), 1200/75 baud (V23), 1200/1200 baud (V22) and 2400/2400 baud (V22bis).

Logging on at the highest speed your modem can support should be automatic (provided you tell the modem which speed to use by setting your BBC baud rates accordingly). If this does not happen, the appropriate adjustments to Hayes 'S' registers 18 and 25 can be made to force the modem to lock on only at its highest rate.

■ The implications of this move are that it no longer becomes necessary for many owners to own a 1200/75 baud modem, as Prestel was often the only service which was used at this speed.

This effectively means that low-cost modems such as the Amstrad range, and the various portable line-powered units, will become more attractive prospects. It also puts the pressure on private Viewdata system operators to upgrade their hosts to run at the full range of speeds.

■ Some interesting comms news from the recent *Which Computer?* Show in Birmingham. Beebug is planning to release an internal podule-based modem for the Archimedes. The modem will be capable of all four speeds up to V22bis. This is at present undergoing BABT approval, and so it's anyone's guess when it will be available for sale. Beebug was able to show *Hearsay* taking advantage of the Prestel Vasscom system. Miracom was showing its new range of V32 modems, capable of all speeds up to 9600/9600 baud, and a special 13800/450 baud speed. Miracom has reduced the price of its Courier 2400E modem to £595 – a good price if you want to use MNP error correction and compression.

The only 9600 baud modem in sight specifically for Acorn machines is the Computer Concepts fax podule, which was also shown at the *Which?* show – it remains to be seen whether this could be used as a high-speed data modem.

■ The new organisation for sysops and others interested in comms mentioned in this column a couple of months ago has got off the ground. The Association of British Communications (ABC) has issued its startup documents, application form and constitution, and appointed a steering committee.

One of the benefits of membership will be a discount on comms related equipment. Membership costs £6 per year, and a membership form, and copies of the above documents can be obtained from the ABC chairman, Carl Wright on (0603) 505971, or on his bulletin board on (0603) 250689 (V21/V23 24 hours).

■ Featured bulletin board of the month is run by Gloucester Acorn dealer AJL Electronics. It's aimed at customers, Acorn users, and radio enthusiasts. Down-loadable BBC telesoftware is available, and a thriving electronic mail section is provided. The board runs on EBBS software 24 hours a day on (0452) 309125, at V21, V22 and V23 speeds. The sysop is Andy Luckman, proprietor of AJL Electronics.

*If you have any comms news please send it to David Atherton at* BBC Acorn User, *or contact him on his mailboxes Telecom Gold 72:MAG11596 or via Prestel 942876210.*

# FREE! TENSTAR PACK WORTH OVER £229!



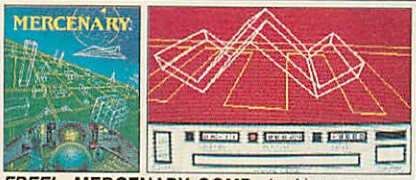
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## NEWS IN BRIEF

■ Anglia Television has released a resources pack for history, geography and environmental studies, through ITCA titled *Farm Buildings*. Based around a *Key* datafile on the subject, the pack comprises work cards including photographs, two posters, teacher's notes and help on preparations for fieldwork.

■ Sherston Software is offering a range of services and support to advisory teachers for Information Technology. Up to 10 Sherston titles may be loaned over one term and a 50 per cent discount purchase option may then be used after that time or in the first instance. For those running courses or seminars, a bulk loan may be organised for a short period.

■ A report from the Information Technology in Teacher Education association (ITTE) claims that new teachers have been poorly prepared to use new technology in the classroom. The association calls for a rise in funding and the use of experienced teachers from the classroom to overcome the shortfall of trained staff.

■ The Association of Computing/IT Teachers has been set up to service the needs of teachers who teach Computing or IT as a subject. Set up by Bryan Weaver of ILEA in conjunction with a group of friends, the association is supported by MUSE, CEG and the BCS Schools Committee.

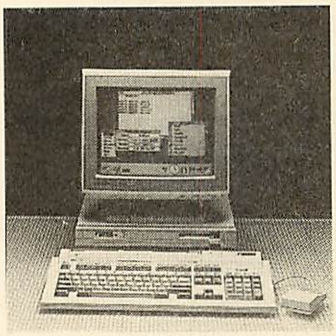
The association is now intending to hold a conference in July in York. The conference is almost certain to address the implications of the Working Party Report on Design and Technology for which area the association sees itself as particularly relevant. Membership is £12 per annum and further details are available from ACITT Administration, 89 Hutton Avenue, Hartlepool, Cleveland TS26 9PR.

# £4 million DTI scheme boosts Arc sales

*by Nick Evans*

The Department of Trade and Industry has announced £4 million of extra money for local education authorities to spend on 16- and 32-bit computers and peripherals. The scheme is intended to boost schools' efforts to introduce the new core subject of design and technology in the national curriculum, and provides a 100 per cent grant towards the cost of new equipment.

The money is divided into two parts. Up to half, known as Part A, had to be spent by the end of March on computer systems, including bundled software, and the rest on peripherals



**Arc goes in spring sale**

such as plotters, scanners and laser printers, as well as DTP, CAD and business studies software. This Part B money must be spent by the end of July. Each LEA was informed of the scheme and its share of the money in a letter sent from the DTI to chief education officers and technology advisors.

The letter suggested five companies – Acorn, Apple, Commodore, IBM and Research Machines – but it stressed that any machine could be bought with the money.

The only restrictions were that machines must be 16 or 32-bit, so Acorn hopes to boost Arc sales through the scheme.

Mike Bostock of Redbridge LEA said that 'With our allocation we will be able to look at a complete Archimedes system for almost every secondary school in our area.'

## New print options

*Front Page Special Edition*, the simple desktop publishing system from Newman College Computer Centre, now has five extra fonts in addition to the six provided with the software.

Broadway, Yankee, Roman, Tabloid and Old English are a mixture of headline and text fonts created with certain study themes in mind. A further font will also soon be available which provides crisp quality printing for main body text.

The new fonts disc is £7 per copy to individual purchasers and £50 per copy for an LEA licence irrespective of size.

## Spring collections from Cambridge

Cambridgeshire Software House has several new releases.

*On the House* is designed for 10-16 year olds and is intended to be the central part of a project based around the building industry. It is also suitable for work in CDT and Maths and involves the planning and management of materials and tradesmen in the building of an imaginary house.

*Rescue* is an adventure in the educational tradition with codebreaking, mazes, problem-solving and a wide variety of other tasks to suit 7-15 year olds.

Two discs, *Subtraction – Hundreds Tens and Units* and *The Addition and Subtraction of Fractions* provide teachers with support in dealing with the concepts behind these topics. Designed for the 8+ age range they are also suitable for special needs use.

*Maths in Space* is an adventure which reinforces number-bonding skills. Mental arithmetic is used to progress through the story to find the identity of the 'Professor' and then escape!

## NERIS widens net

An agreement between NERIS (National Educational Resources Information Service) and Book Data, the publications information service, means that information on new publications from educational publishers will be made available to NERIS users.

This facility will significantly extend the coverage of NERIS's database by providing information relating to school and further education texts in all subjects, non-book materials and relevant books about educational subjects.

Previously, NERIS's 3500 users only had access to publishers' information relating to educational software. Now there will be all the information you could need relating to title, publisher, author, price and content available from the same system.

# Contacts

**Acorn Computers,** Fulbourn Road, Cherry Hinton, Cambridge CB1 4GN.

**Anglia Television,** Anglia House, Norwich NR1 3JG.

**Area Resource Centre,** 28 Railway St, Antrim, N Ireland.

**Association of Computing/IT Teachers (ACITT),** 89 Hutton Ave, Hartlepool, Cleveland TS26 9PR.

**Book Data,** Northumberland House, 2 King Street, Twickenham, Middx, TW1 3RZ.

**Cambridge Computer,** Bridge House, 10 Bridge St, Cambridge CB2 1UE.

**Cambridge Software House,** 1 Andersons Court, Newnham Road, Cambridge CB3 9EZ.

**Computeach,** A203 Portview Trade Centre, 310 Newtownards Road, Belfast BT4 1HE.

**Computer Concepts,** Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.

**Epson UK,** Campus 100, Maryland Ave, Hemel Hempstead, Herts HP2 7EZ.

**Information Technology in Teacher Education (ITTE),** c/o Stephen Heppell, Essex Institute of Higher Education, Sawyers Hall Lane, Brentwood, Essex CM15 9BT.

**Intelligent Interfaces,** 43b Wood Street, Stratford upon Avon, Warwickshire CV37 6JQ.

**Interactive Media Resources,** 8 North Street, Wolverhampton, West Midlands WV1 1RD.

**Micronet,** Telemap Group Ltd, Durrant House, 8 Herbal Hill, London EC1R 5EJ.

**Music Sales,** Distribution Centre, Newmarket Road, Bury St Edmonds, IP33 3YB. Tel: (0284) 702600.

**National Educational Resources Information Service (NERIS),** Maryland College, Leighton Street, Woburn, Milton Keynes, MK17 9JD.

**Newman College Computer Centre,** Newman College, Genners Lane, Bartley Green, Birmingham B32 3NT.

**Qume,** Qume House, Parkway, Newbury, Berkshire RG13 1EE.

**Sherston Software,** Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH.

**Tecnation,** 23 The Nursery, High Street, Sutton Courtenay, Abingdon, OX14 4UA.

# In next month's issue

Dave Atherton presents an introduction to programming in PostScript, the language of the laser printer. We explain how you can pass variable data from one program to another. Joe Telford takes a look at how schools will face up to managing their own finances. And Chris Drage and Nick Evans study databases in schools.

We will also be bringing you an update on the *BBC Acorn User* show in July. Plus, all the regular columns are there – news, music, Agora and Hints and Tips.

## Mega results

Last December's *Mega Music* competition proved challenging for our readers. Nobody got every question right but E A Cook from Gwent came closest. This, and his idea of putting sound and graphics together, won him first prize of a Hybrid Music System.

Congratulations to the runners up. They each win a Hybrid's Music 5000 Junior. They are: Kevin Finn from Cheshire, Robin MacKenzie from Leeds, Andrew Nightingale from Cambridge, Stephen Blenkinsop from Liverpool and J Archibald from Horsham, West Sussex.

The correct answers were: 1(a), 2(b), 3(b), 4(c), 5(a) and 6(b).

Third prize winners have been notified by post.

## Diary dates

*6-8 June.* Computer North, Greater Manchester Exhibition Centre, Manchester. Contact Cahners Exhibitions: Tel: 061-832 4242. Business exhibition only.

*6-8 June.* European Unix User Show, Alexandra Palace, London. Contact: Clair Philips, EMAP International Exhibitions, Bedford Row, London WC1: Tel: 01-404 4844.

*20-22 June.* Electronic Publishing & Print Show, Wembley Exhibition Centre, London. Contact: Blenheim Online: Tel: 01-868 4466.

## BLUNDERBOX

The 'definitive' modification for last August's PrtSc utility shown in Letters, March *BBC Acorn User,* was anything but. Thanks to RSF Harding of West Yorkshire for being the first to spot that some of the amended code had been left out. These changes should be made to the original version of PrtSc.

```
 390 LDX #2

 500 CPY #&AB
 510 BNE exit

delete lines 520-640

 670 PLA
 680 LDA #0
 690 PHA

1080 BMI loop0
1081 BNE loop2
1082 .loop0
1083 LDY #3
1084 JSR rvstest
1085 LDA #135
1086 JSR osbyte
1087 TXA
1088 PHA
1089 LDY #7
1090 JSR rvstest
1091 PLA
1092 BMI loop1
1093 BNE loop2
1094 .loop1
1095 LDA #32
1100 .loop2

1601 :
1602 .rvstest
1603 LDX #4
1604 .rvsloop
1605 LDA rvsdata,Y
1606 JSR oswrch
1607 DEY
1608 DEX
1609 BNE rvsloop
1610 RTS
1611 :

1781 :
1782 .rvsdata
1783 OPT FNequw(&1187)
1784 OPT FNequw(&1100)
1785 OPT FNequw(&1180)
1786 OPT FNequw(&1107)

1820 PROCchecksum(&900,e
nd-1,&78BE)
```

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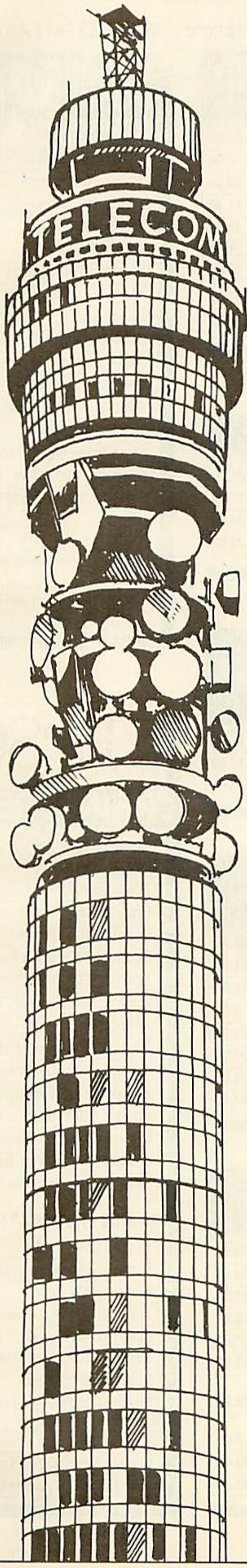
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Date out:

Answered by:

# SOFTWARE PACKAGES FOR SCHOOLS




British Telecom has produced three new science-based software packages for schools in collaboration with the Computers in the Curriculum Project, Kings College, University of London.

The programs are designed for students, aged from 14 onwards, following physics, electronics and technology courses.

## PULSE CODE MODULATION

This program allows the student to investigate how, by Pulse Code Modulation, and analogue signal – speech, sound and video – are converted (coded) into digital pulses, transmitted and decoded back into a replica of the original analogue signal. The written material includes information on the conversion process, sampling, frequency levels, distortion and how PCM equipment is utilised in the construction of telephone systems.

## SIGNAL TRANSFER

This interactive icon driven program provides students with the opportunity of devising a telephone link, requiring them to set up, transmit and receive a comprehensible signal from one exchange to another.

Users will be able to test the strength and attenuation of signals, incorporate cables, regenerators and exchanges into their telephone link and assess, at any point in time, line loss and signal to noise ratios.

## PICTURE MANIPULATION

The program is designed for students to experiment with some of the manipulations that can be made on a video signal once it has been digitised.

The student is introduced to a simplified version of the processes involved, the various ways of altering the information to produce a modified picture and the use of the logical operations such as AND, OR, NOT and NOR as a means of changing colours.

British
TELECOM

British Telecom Education Service, P.O. Box 10, Wetherby, W. Yorks LS23 7EL.

| | | Qty | Cost |
|---|---|---|---|
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| Picture manipulation | £15.00 | | |
| Signal transmission | £15.00 | | |
| Combined package: 3 Science Programs | £40.00 | | |
| (Please tick appropriate box.) BBC 40☐ BBC 80☐ RML 480Z☐ Nimbus☐ | | | |

I enclose a cheque for a total value £__________ (Cheques should be crossed and made payable to British Telecom).

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School and Address ................................................................

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| * Acorn 32016 Co-Processor | £ 899.00 |

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| * AMX Mouse | £ 29.95 |
| * Digimouse | £ 39.95 |

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| * Pace Nightingale | £ 99.00 |
| * Pace Nightingale Combo | £ 129.00 |
| * Pace Linet Modem | £ 142.00 |
| * WS2000 | £ 113.00 |
| * WS3000 V21/23 | £ 285.00 |
| * WS4000 | £ 159.00 |
| * Pace Series4 V/21/22 | £ 360.00 |

## CONSUMABLES FOR ACORN COMPUTERS

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| * BBC Master Dust Cover | £ 4.50 |
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| * Eprom Programmer Up to 64k | £ 69.95 |

### BOOKS (No VAT)

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| * BBC User Guide | £ 14.95 |
| * BBC Master Ref Part I | £ 14.95 |
| * BBC Master Ref Part II | £ 14.95 |
| * Acornsoft View Manual | £ 10.00 |
| * Acornsoft Viewsheet Manual | £ 10.00 |
| * Acornsoft Viewstore Manual | £ 10.00 |
| * Acornsoft DFS Operating Manual | £ 6.95 |
| * Advance Sideways RAM User | £ 9.95 |
| * BBC Advance User Guide | £ 16.95 |
| * Master Advance Ref Guide | £ 17.95 |

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| * Single Drive 400k 40/80 | £ 99.00 |
| * Single Drive 400k 40/80 + PSU | £ 119.00 |
| * Dual Drive 800k 40/80 | £ 199.00 |
| * Dual Drive 800k 40/80 + PSU | £ 229.00 |
| * BBC Master Bridge Drive 800k | £ 249.00 |
| * BBC 20MB + 400k Drive | £ 799.00 |
| * BBC 20MB Hard Disk Drive | £ 699.00 |

## SPREADSHEETS

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|---|---|
| * Acornsoft Viewsheet | £ 36.00 |
| * Acornsoft Viewplot | £ 22.00 |
| * C.C. Intersheet | £ 38.00 |
| * C.C. Interchart | £ 27.00 |
| *** Mini Office II Disk Version** | |
| * For Model B & B+ 40t or 80t | £ 14.75 |
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| * For B, B+ Master & Compact | £ 48.00 |
| * C.C. The Mega 3 ROM | £ 77.00 |

## CAD & DRAWING SOFTWARES

| | |
|---|---|
| * AMX Mouse & Superart | £ 59.00 |
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| * AMX Database | £ 21.00 |
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| * AMX MAM | £ 17.00 |

## UTILITIES

| | |
|---|---|
| * Acornsoft ADFS ROM | £ 26.00 |
| * Acornsoft Printer Server ROM | £ 39.00 |
| * Acornsoft Basic Editor | £ 24.00 |
| * Acornsoft Termulator | £ 29.00 |

## DATABASE MANAGEMENT SYSTEMS

| | |
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| * Philips 7923 FSQ 12" Amber | £ 99.00 |
| * Philips 7713 FSQ 14" Green | £ 103.00 |
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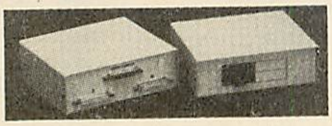
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| Citizen 120D | £4.25 | Star LC10 | £3.90 |
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| Epson LQ 800 | £3.90 | Star LC24-10 | £4.50 |
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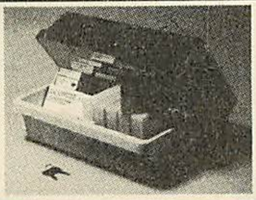
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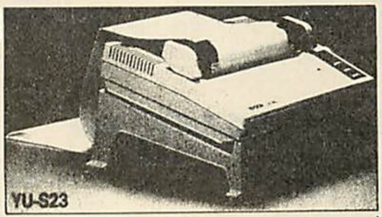
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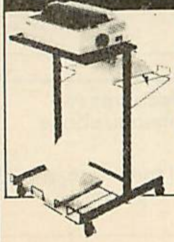


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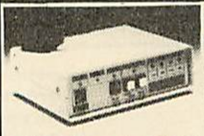
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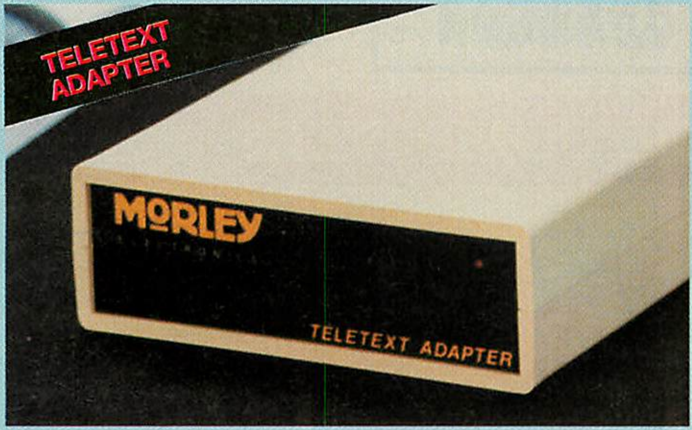
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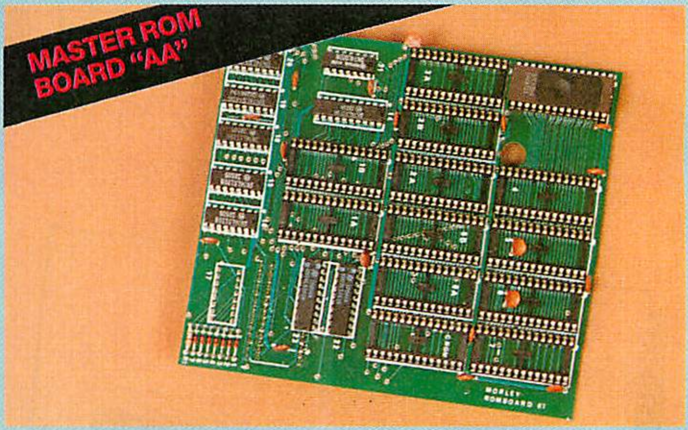
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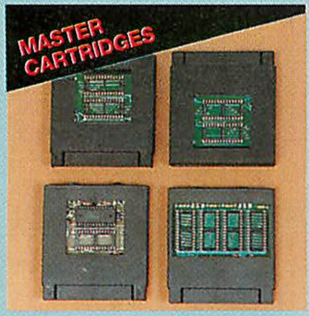
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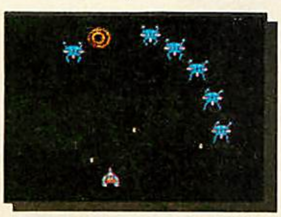
# CLARES ARCADE GAMES

Some real classics from Clares, "Arcade 3" and "Overload". Pit your wits against Mega Monsters, defeat Deadly Invasions, push your playing powers to the limit.

## ARCADE 3 GAMES COMPILATION

This three-in-one combination will tie you to your computer terminal for hours.

First, there's an invasion by the Evil Aliens (they're always doing that sort of thing). You are a star cadet. Can you save Zarkon from a grizzly and gruesome fate?



ZARKON INVASION

And here's a hungry little game, Mazey Man. He's feeling peckish but so are the guards, it's eat or be eaten in this gastronomic maze game.



MAZEY MAN

Bounce-A-Ball's fun, that is if you're not a brick. Because bricks get broken in this colourful and complex game, smash the colourful bricks, but can you be as quick as the ball?



BOUNCE • A • BALL

Arcade Three, three tests of skill and ingenuity from Clares.

£14.95

## OVERLOAD THE MEGA MONSTER EXPERIENCE

It's a mega-monster experience. Why? Well it's all Igor's fault you see. He created a whole host of video nasties after booby trapping Frank 'n' Stein's interstellar cell phone.

As a fitting reward for this dastardly deed, Igor is sentenced to life imprisonment in a spheroid. But spheroids being the dull places they are, drive Igor to suicide, and the trouble is, the nasties are still on the loose.



Here's where you come in, you are Cheetah, Igor's 11 legged flea. Your job, sort out those evil slime balls! It's not as easy as it looks, however, Frank 'n' Stein's set up a little sabotage of his own and the nasties must now die in the correct order.



And if that isn't bad enough, there's a time limit too. Squash the nasties in the wrong order or exceed the time limit and you could end up... well, it's just too horrible to write about.



£14.95

**Clares have done it again.**
**These games will test your skills, patience and dexterity to the limit.**

RISC OS COMPATIBLE

CLARES MICRO SUPPLIES

98 Middlewich Road, Rudheath, Northwich, CHESHIRE CW9 7DA.
Telephone: 0606 48511 Fax No: 0606 48512

# READER SURVEY
# Win £1000 of Acorn kit



As a reader of *BBC Acorn User*, you have great influence on the content of the magazine. This works in three ways. First, we take great notice of the articles you send in. All of these get looked at, and the best are published. Almost every issue has at least one article by someone who has never had anything published before.

Second, the editorial team take note of comments made at shows and exhibitions, our major chance to meet you. This is where the *BBC Acorn User* show in July becomes important.

Third, there's our annual reader survey – it's your best chance to influence what appears in the magazine, to suggest new topics, and to criticise the current content. We want to know who you are, and what you think. Ideas taken up from past surveys include the Noticeboard, reader offers, the Music and DTP pages.

Survey answers will be compiled statistically, but each individual answer is completely confidential. Please don't exaggerate – your replies will have no bearing on the outcome of the competition. You can send us a photocopy of the form, if you don't want to cut up your magazine. And, even if you don't own an Acorn micro, you can still send in your reply.

To add a little spice, here's the challenge. Think up a suggestion for an article or short series, that must appeal to model B owners and Arc owners alike. The prize for the best suggestion, in the opinion of the Editor, is £1000 to spend on Acorn equipment of your choice. You could spend it on an Arc, or a new Master 128, or even put it towards a Domesday system – it's up to you. Entries must be in by 5th June, and the winner will be notified by post.

## ABOUT YOUR COMPUTER SYSTEM

**1 What micro(s) do you have?**

☐ 01 BBC model B
☐ 02 Electron
☐ 03 Master 128 or B+
☐ 04 Master 512
☐ 05 Compact
☐ 06 Archimedes 305
☐ 07 Archimedes 310
☐ 08 Archimedes 440
☐ 09 RM Nimbus
☐ 10 Macintosh
☐ 11 Z88
☐ 12 IBM PC or compatible
☐ 13 None
☐ 14 Other____________

**2 How many micros are there in your household**

☐ 01 None
☐ 02 One
☐ 03 Two
☐ 04 Three or more

**3 Which of the following do you own or hope to buy in the next 12 months?**

| Own | Hope to buy | |
|---|---|---|
| ☐ 01 | ☐ 12 | Disc drive |
| ☐ 02 | ☐ 13 | Printer |
| ☐ 01 | ☐ 14 | Monitor |
| ☐ 04 | ☐ 15 | Mouse |
| ☐ 05 | ☐ 16 | Second or co-processor |
| ☐ 06 | ☐ 17 | Shadow RAM |
| ☐ 07 | ☐ 18 | Sideways RAM |
| ☐ 08 | ☐ 19 | Modem |
| ☐ 09 | ☐ 20 | Hard disc |
| ☐ 10 | ☐ 21 | Teletext receiver |
| ☐ 11 | ☐ 22 | Other____________ |

**4 What do you mainly use your micro for?**

☐ 01 Recreation or hobby
☐ 02 School or college work
☐ 03 Teaching own children
☐ 04 Teaching at school or college
☐ 05 Home or personal affairs
☐ 06 Business
☐ 07 Club or society administration
☐ 08 Doing office work at home
☐ 09 Other____________

**5 What are the top five applications you use your micro for?**

☐ 01 Accounting
☐ 02 Adventure games
☐ 03 Arcade games
☐ 04 CAD/CAM
☐ 05 Communications
☐ 06 Computer terminal
☐ 07 Databases
☐ 08 Desktop publishing
☐ 09 Equipment control
☐ 10 Graphics/art/design
☐ 11 Home education
☐ 12 Music
☐ 13 Research
☐ 14 Spreadsheets
☐ 15 Teaching
☐ 16 Your own programing
☐ 17 Wordprocessing
☐ 18 Other____________

**6 If you program, which of the following do you use?**

☐ 01 6502 assembler
☐ 02 ARM assembler
☐ 03 Basic
☐ 04 C
☐ 05 Logo
☐ 06 Pascal
☐ 07 Prolog/Lisp
☐ 08 Other____________

**7 If you have a BBC or Electron disc system, which type is it?**

☐ 01 5.25-inch 40-track
☐ 02 5.25-inch 80-track
☐ 03 5.25-inch 40/80-track
☐ 04 3.5-inch
☐ 05 Hard disc

**And do you use?**

☐ 06 DFS or compatible
☐ 07 ADFS

**8 Which of the following do you have?**

☐ 01 Basic 1
☐ 02 Basic 2 or later
☐ 03 Disc sector editor
☐ 04 *Fleet St Editor*
☐ 05 *InterSheet*
☐ 06 *InterWord*
☐ 07 *Mini Office*
☐ 08 *Stop Press*
☐ 09 *Super Art*
☐ 10 *View*
☐ 11 *ViewSheet*
☐ 12 *ViewShore*
☐ 13 *Wordwise/Plus*
☐ 14 *Artisan*
☐ 15 *First Word Plus*
☐ 16 *Pipedream*

**9 Do you use any of the following?**

☐ 01 Electronic mail
☐ 02 Bulletin boards
☐ 03 User group
☐ 04 Network (eg Econet)

**10 Has your micro ever needed repair?**

☐ 01 Yes
☐ 02 No

**11 Where do you usually buy your hardware and software?**

| Hard | Soft | |
|---|---|---|
| ☐ 01 | ☐ 05 | High street store |
| ☐ 02 | ☐ 06 | Mail order |
| ☐ 03 | ☐ 07 | Acorn dealer |
| ☐ 04 | ☐ 08 | Other____________ |

**12 Please estimate your personal software spending over the last 12 months:**

☐ 01 Less than £20
☐ 02 £20 to £49
☐ 03 £50 to £99
☐ 04 £100 to £299
☐ 05 £300 to £499
☐ 06 Over £500

**13 And over the next 12 months:**

☐ 01 Less than £20
☐ 02 £20 to £49
☐ 03 £50 to £99
☐ 04 £100 to £299
☐ 05 £300 to £499
☐ 06 Over £500

## ABOUT YOU

**14 Are you:**

☐ 01 Male
☐ 02 Female

**15 How old are you?**

☐ 01 Under 16
☐ 02 16-24
☐ 03 25-34
☐ 04 35-44
☐ 05 45-54
☐ 06 55 or older

**16 What is your occupation?**

☐ 01 Student at school
☐ 02 Student at college
☐ 03 Teaching/training
☐ 08 Computing/electronics
☐ 09 Engineering
☐ 10 Other professional

☐ 04 Research and development
☐ 05 Self employed/small business
☐ 06 Health/welfare
☐ 07 Media/creative
☐ 11 Managerial
☐ 12 Admin/clerical
☐ 13 Manual/tradesman
☐ 14 Uniformed services
☐ 15 Unwaged
☐ 16 Other__________

**17 Do you use another computer at work or college?**
☐ 01 No
☐ 02 Acorn/BBC micro
☐ 03 IBM PC or compatible
☐ 04 Macintosh
☐ 05 RM Nimbus
☐ 06 Unix workstation
☐ 07 Other__________

**18 How many micros are there at your place of work?**
☐ 01 None
☐ 02 One to nine
☐ 03 10 to 19
☐ 04 20 or more

**19 Do you authorise expenditure on computers at work?**
☐ 01 Yes
☐ 02 No

## ABOUT BBC ACORN USER

**20 How do you usually get *BBC Acorn User?***
☐ 01 By subscription
☐ 02 Regular newsagent's
☐ 03 order
☐ 03 Buy it regularly
☐ 04 Read someone else's
☐ 04 library/school copy

**21 For how long have you read *BBC Acorn User?***
☐ 01 Less than 3 months
☐ 02 Three to six months
☐ 03 Seven to 12 months
☐ 04 More than a year
☐ 05 Since 1982

**22 How many other people read your copy?**
☐ 01 None
☐ 02 One to three
☐ 03 Four or more

**23 Which of the following do you buy or read regularly?**

| Buy | Read | |
|---|---|---|
| ☐ 01 | ☐ 10 | *BBC Acorn User* |
| ☐ 02 | ☐ 11 | *A&B Computing* |
| ☐ 03 | ☐ 12 | *Beebug* |
| ☐ 04 | ☐ 13 | *Byte* |
| ☐ 05 | ☐ 14 | *Educational Computing* |
| ☐ 06 | ☐ 15 | *Electron User* |
| ☐ 07 | ☐ 16 | *Personal Computer World* |
| ☐ 08 | ☐ 17 | *Micro User* |
| ☐ 09 | ☐ 18 | *Times Educational Supplement* |

**24 Do you read the advertising in *BBC Acorn User?***
☐ 01 Some
☐ 02 Most
☐ 03 All

**25 Have you bought mail-order products from advertisements in *BBC Acorn User?***
☐ 01 Yes
☐ 02 No

**26 From whom would you order products by mail order?**
☐ 01 Any advertiser in *BBC Acorn User*
☐ 02 Only regular *BBC Acorn User* advertisers
☐ 03 Only well-known industry names

**27 How do you rate the following features in *BBC Acorn User?***

| Good | Fair | Poor | |
|---|---|---|---|
| ☐ 01 | ☐ 22 | ☐ 43 | News |
| ☐ 02 | ☐ 23 | ☐ 44 | Education news |
| ☐ 32 | ☐ 24 | ☐ 45 | Noticeboard |
| ☐ 04 | ☐ 25 | ☐ 46 | Preview |
| ☐ 05 | ☐ 26 | ☐ 47 | Hints and Tips |
| ☐ 06 | ☐ 27 | ☐ 48 | Arc Agora |
| ☐ 07 | ☐ 28 | ☐ 49 | Competitions |
| ☐ 08 | ☐ 29 | ☐ 50 | Technical articles |
| ☐ 09 | ☐ 30 | ☐ 51 | General articles |
| ☐ 10 | ☐ 31 | ☐ 52 | Education articles |
| ☐ 11 | ☐ 32 | ☐ 53 | Joe's Jottings |
| ☐ 12 | ☐ 33 | ☐ 54 | Yellow pages |
| ☐ 13 | ☐ 34 | ☐ 55 | Hardware reviews |
| ☐ 14 | ☐ 35 | ☐ 56 | Software reviews |
| ☐ 15 | ☐ 36 | ☐ 57 | Music page |
| ☐ 16 | ☐ 37 | ☐ 58 | DTP page |
| ☐ 17 | ☐ 38 | ☐ 59 | Letters |
| ☐ 18 | ☐ 39 | ☐ 60 | Free ads |
| ☐ 19 | ☐ 40 | ☐ 61 | Abuser's diary |
| ☐ 20 | ☐ 41 | ☐ 62 | Reader enquiry service (if used) |
| ☐ 21 | ☐ 42 | ☐ 63 | Mail order service (if used) |

**28 What were the three best articles you have ever read in *BBC Acorn User?***
☐ 01__________
☐ 02__________
☐ 03__________

**29 What are your two preferences for expanding the *BBC Acorn User* service?**
☐ 01 A *BBC Acorn User* bulletin board
☐ 02 Phone enquiry system
☐ 03 Training courses organised by *BBC Acorn User*
☐ 04 More, regional, *BBC Acorn User* shows
☐ 05 More *BBC Acorn User* software
suggestion:__________
☐ 06 More *BBC Acorn User* reader offers
suggestion:__________

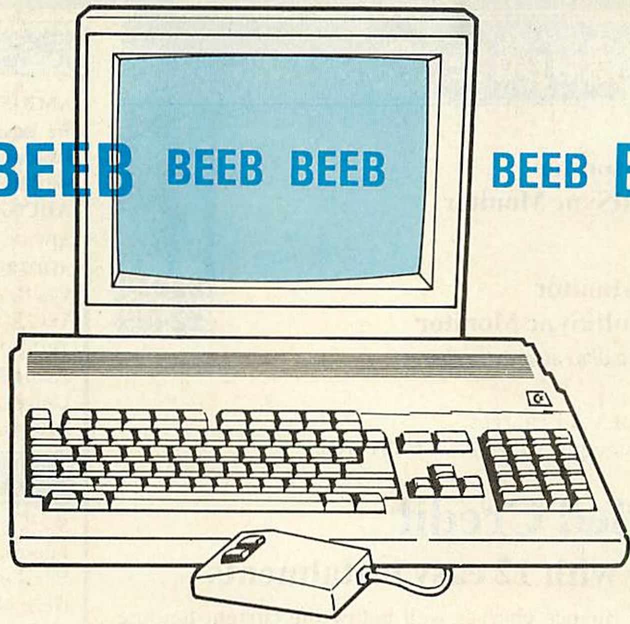
## COMPETITION

Finally, to qualify for the competition, think up and send us an idea for an article or short series in *BBC Acorn User* that would appeal to both model B and Archimedes owners.

Fill in your name and address below, and send the survey to *BBC Acorn User* Survey, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Your entry for the competition must arrive by June 6, 1989.

__________
__________
__________
__________ Postcode__________

# Now the Amiga makes a new noise.




You've got an Amiga but want to expand your programming options and your software base.

Or maybe you've got a BBC Model B computer and want to upgrade to an Amiga without making your existing software redundant.

In either case you need THE EMULATOR.

THE EMULATOR allows you to run programs originally written for the BBC Micro on a Commodore Amiga. In some cases they'll run seven times faster than on the machine for which they were intended.

Of course, that also means your own BBC Basic programs will also whizz along at lightning speed.

So for just £49.99 (or £39.99 to education establishments) you could be adding a new dimension to your computing power.

THE EMULATOR includes hotline technical support and is available from:

*James Associates*
*6 Hazlitt Mews*
*London W14 0JZ*
*Tel:01-603 3313*

Order by Access or send in the coupon.

Please send me ....... copies of THE EMULATOR at £49.99 (inc VAT) each plus £2.00 P&P

Name:

Address:

Postcode: Tel:

Commodore

# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190
305 Edgware Road, London W2 Tel: 01-723 0233

## Archimedes, BBC COMPUTERS & ECONET REFERRAL CENTRE

## Archimedes Computer Systems

| | |
|---|---|
| Archimedes 310 Base System | £695 |
| Archimedes 310 + Acorn Colour Monitor | £885 |
| Archimedes 310 + ECM5413 MultiSync Monitor | £975 |
| Archimedes 440 Base System | £2049 |
| Archimedes 440 + Acorn Colour Monitor | £2239 |
| Archimedes 440 + Taxan 770+ MultiSync Monitor | £2489 |

*(All 440 systems include Software Developers Toolbox at no extra charge)*

**Add £50 for PC Emulator**

The above prices do not include carriage or VAT charges.
Payment with order can be made by cash/cheque/VISA/ACCESS cards.
(allow 7 days to clear the cheques)

## Extended Credit

### Archimedes system with 12 easy instalments

We offer 12 months extended credit at finance charges well below the current lending rates (typical APR 19.8%) as shown below:

| | Deposit (with order) | 1 instalments (monthly) |
|---|---|---|
| Archimedes 310 Base System | £67 | £72.63 |
| Archimedes 310 + Acorn Colour Monitor | £85 | £92.51 |
| Archimedes 310 + ECM5413 MultiSync Monitor | £94 | £101.88 |
| Archimedes 440 Base System | £200 | £213.87 |
| Archimedes 440 + Acorn Colour Monitor | £230 | £232.57 |
| Archimedes 440 + Taxan 770+ MultiSync Monitor | £260 | £258.10 |

*(All 440 systems include Software Developers Toolbox at no extra charge)*



The above prices are inclusive of VAT charges but do not include carriage charges which will be charged with the deposit if applicable.

The above prices are typical examples of our offer. We can offer similar terms for any system that suits individual requirements. Application for the finance is simple and can be completed in two days. Ask for details.

Technomatic is a licenced credit broker

## SPECIAL DISCOUNTS

Here's another great offer from Technomatic. We can provide attractive discounts to **Education Authorities, Schools, Colleges** and **Health Authorities.** Simply phone us or write, outlining your requirements, and we will supply a quotation.

## CAREER VACANCIES

Due to our continued expansion Technomatic Limited have .vacancies for **Bench Technicians.** You should have some experience of working on BBC computer systems but there are opportunities for further training to broaden your skills. Technomatic can offer a competitive salary according to your age and experience and real opportunities for career progression. If you are interested please send your CV to J Mehta, Technomatic Limited, Techno House, 468 Church Lane, London NW9 8TQ.

## MASTER SERIES

**AMB15** Master 128K — £356(a)

**We include *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.**

**ADC06** Turbo 65C102 Module — £115(b)

| | | | |
|---|---|---|---|
| ADF10 Econet Module | £49(c) | Acorn Rom Cartridge | £13(d) |
| ADJ22 Ref Manual I | £14(c) | ADJ23 Ref Manual II | £14(c) |
| View User Guide | £8.50(d) | V/sheet User Guide | £8.50(d) |
| TRC2 ROM Cart | £7.50(d) | TRC4 4ROM Cartridge | £11(d) |
| TRC32 32K RAM Cart. | £21(d) | Master Dust Cover | £4.75(d) |

| | |
|---|---|
| Acorn IEEE Interface (for B, B+ Master) | £265(b) |
| Universal CoProc Adapter | £49(b) |
| BBC Domesday System | £3,750(2×a) |

## ECONET ACCESSORIES

| | |
|---|---|
| Stacking Filestore E01S | £999(d) |
| Filestore Hard Disc E40S | £899(a) |
| Filestore Hard Disc E60S | £1199(a) |

(These will be available in limited numbers during Dec/Jan so order in good time to ensure early delivery)

**ECOLINK Card** *Full spec on request* — £269(b)
(PX/XT/AT interface card for connection to Econet network)

| | | | |
|---|---|---|---|
| Econet Starter Kit | £85(b) | Econet Bridge | £174(b) |
| Econet Socket Set | £29(c) | Printer Server Rom | £41(d) |
| File Server Level II | £75(b) | 10 Station Lead Set | £34(d) |
| Master FS Utility Disc | £17.25(d) | | |

## New RISC OS

The new multi tasking operating system for the Archimedes computers, RISC OS will be released in March/April this year. ***We are able to offer you an introductory price of £29(c) whilst our initial stocks last,*** then we will revert to normal price of £49. Order your set now and be sure of being one of the first recipients of this OS at the concessionary price. Use VISA/ACCESS to order and you will not be charged until we actually despatch the package to you. The package comprises of four ROMs, two Welcome discs containing applications, games and utilities and Welcome and User Guides.

## EXPANSION SYSTEMS

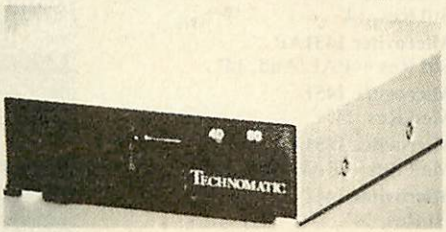
| | |
|---|---|
| 2nd Floppy Drive (305-310) | £118(b) |
| 20Mb Hard disc + Card (305-310) | £469(b) |
| Acorn Backplane (2 slots) | £37(c) |
| AtomWide Backplane (4 slots) | £49(c) |
| TechnoLog Backplane (4 slots) (includes provision for expulsion) | £49(c) |
| Fan for AW/TechnoLog Backplane | £10(d) |
| I/O Podule | £80(c) |
| Acorn ROM Expansion Card | £55(c) |
| CC Rom Expansion Card | £45(c) |
| Econet Network Module | £49(d) |
| MIDI Expansion Card | £66(c) |
| MIDI Add-on to I/O | £37(d) |
| IEEE Interface Card | £283(b) |
| 16bit Parallel I/O Card | £195(b) |
| Dual RS232 Card | £195(b) |
| Armadilo Sound Sampler | £105(c) |
| Fourier Transform Software | £40(d) |
| AtomWide Prototyping Board | £35(d) |
| ARC/BBC Serial Link | £25(d) |
| ARC External drive Adaptor | £30(d) |
| ARC External 5.25" Drive | £90(b) |
| Arc Printer Lead | £7(d) |

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

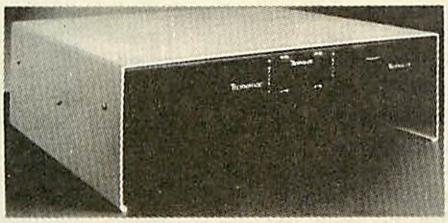
# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

# TECHNOMATIC DISC DRIVES



TS 400



PD 800P

For users who do not need 40/80 switching capability, please specify as such and add suffix N on our product code. Drive price will be reduced by £5/mechanism.

A range of high quality high performance drives to meet the needs of all BBC Micro Users.
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.
*5.25″ floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.
*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.
*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.
*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives. High quality of construction ensures that our plinth drives which offer an elegant space solution do not sag or deform under the weight of a monitor.

**5.25″ Single Drives 40/80 switchable:**

| | |
|---|---|
| **TS400** 400K/640K | £80(b) |
| **PS400** 400K/640K with integral mains power supply | £90(b) |

**5.25″ Dual Drives 40/80 switchable:**

| | |
|---|---|
| **TD800** 800K/1280K | £165(a) |
| **PD800** 800K/1280K with integral mains power supply | £175(a) |
| **PD800P** 800K/1280K with integral mainspower supply and monitor stand | £189(a) |

**3.5″ 80T DS Drives:**

| | |
|---|---|
| **TS351** single 400K/640K | £69(b) |
| **PS351** 3.5″ single drive with integral mains power supply in a 5.25″ case. | £95(b) |
| **TD352** Dual 800K/1280K | £126(a) |
| **PD352** 3.5″ dual drive with integral mains power supply in a 5.25″ case. | £139(a) |

**Combo Drives (5.25″ & 3.5″ drives)**

| | |
|---|---|
| **PD853** with integral psu | £180(a) |
| **PD853P** with integral psu | £205(a) |

**DISC DRIVE MULTIPLEXER**

***For Master, B, B+ and any DFS/ADFS***

| | |
|---|---|
| **TDM2** Two computers/one drive unit | £65(b) |
| **TDM4** Four computers/one drive unit | £115(b) |

## AEDA ARCHIMEDES EXTERNAL DRIVE ADAPTOR

Technomatic's AEDA provides a reliable external disc drive adaptor with a variety of novel features.

★ It is designed for easy and neat installation and takes only a few minutes to instal. Rear fixing plate is supplied in two halves so as not to interfere with existing expansion boards or those likely to be installed in future.

★ It is fully buffered and allows up to three external drives (3.5″ or 5.25″) to be connected.

★ Externally located toggle switch allows selecting either internal or external drive as drive 0 or drive A. This feature is particularly useful when booting up from the external drive is required.

★ AEDA is supplied configured for one internal and up to three external drives. On board options allows for reconfiguration to two internal and two external drives.

★ Other on board options allow setting 'disc eject' from the keyboard if the drive is capable of this facility.

**Technomatic AEDA** **£30(c)**

## MASTER COMPACT

128K RAM, 640K 3.5″ DS Drive + Educ software and our bundled Educ/Fun package included

| | |
|---|---|
| **SYSTEM 1** Entry System | £310(a) |
| **SYSTEM 2** with 12″ Mono Monitor | £365(2×a) |
| **SYSTEM 3** with 14″ Col Monitor | £475(2×a) |

| | | | |
|---|---|---|---|
| 2nd Drive Kit | £90(c) | Serial Kit | £25(d) |
| Mertec Adaptor | £35(c) | TV Modulator | £26(d) |
| Ext Drive Adaptor | £9(d) | Printer Lead | £7(d) |

## WINCHESTER DRIVES

Most popular range of Winchesters for BBC at competitive prices.

Single Winchesters, housed in attractively styled metal enclosures in BBC matching beige colour are fan cooled and powered by switch mode power supply for quiet, efficient and reliable operation.

Winchester/floppy combination drives, housed in our elegant plinth housing.

To get the most from the Winchester, the following utilities are installed on the drives:

★ TREE PLAN: A utility to create an organised directory structure and display it on the screen or dump it to a printer.
★ Formatter and verify program.
★ For Master users our popular front end utility to display the entire contents of the drive in icon format. Files can be loaded simply by pointing at the icons.

| | |
|---|---|
| **P30HD 30Mb Winchester** | £420(a) |
| **P304HP 30Mb Winchester + 640K DS 40/80T floppy** | £609(a) |

*Larger drives available on request.*

## UPGRADE KITS

| | | | |
|---|---|---|---|
| 1.20S ROM | £15(d) | ADFS ROM | £26(d) |
| DNFS ROM | £19(d) | 1770 DFS Kit | £49(d) |
| BASIC II ROM | £22.50(d) | Econet Kit | £55(d) |

## RAM/ROM EXPANSION

| | |
|---|---|
| **ATPL Board** for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS | £37(c) |
| ATPL Battery backup kit | £18(d) |
| ATPL Board for BBC+ (10 Roms) | £31(c) |

## 3M FLOPPY DISCS

**5.25″ Discs in packs of 10**

| | |
|---|---|
| **744** 40T SS DD | £6.50(d) |
| **745** 40T DS DD | £7.00(d) |
| **746** 80T SS DD | £12.00(d) |
| **747** 80T DS DD | £11.00(d) |

(Add £1 for library case packing)

**3.5″ Discs in packs of 10**

| | |
|---|---|
| **80T** SS DD | £10.00(d) |
| **80T** DS DD | £11.75(d) |

Voucher for free Quartz wrist watch with every purchase of 5 packs of 3M discs.

## BULK DISCS

| | |
|---|---|
| 50 5.25″ 40 T single sided discs with sleeves in lockable box. | £25(b) |
| 50 5.25″ 80 T double sided discs with sleeves in lockable box. | £32(b) |
| 50 3.5″ 80T double sided discs with sleeves in lockable box. | £60(b) |

**FLOPPICLENE DRIVE HEAD CLEANING KIT**

| | |
|---|---|
| **5.25″ Kit** with 20 disposable discs | £14.00(d) |
| **3.5″ Kit** with 20 disposable discs | £14.75(d) |

**DISC STORAGE BOXES**

| | |
|---|---|
| **DB340** Lockable 40 × 3.5″ | £8.50(c) |
| **DB550** Lockable 50 × 5.25″ | £6.50(c) |
| **DB570** Lockable 70 × 5.25″ | £8.50(c) |
| **DB5100** Lockable 100 × 5.25″ | £10.50(c) |

## EPROMS/RAMS

| | | | |
|---|---|---|---|
| 2764-25 | £2.80 | 27256-25 | £6 |
| 27128-25 (12.5vVpp) | £4.50 | 27128-25 (21vVpp) | £6 |
| 27512-25 | £9 | 6264LP-15 | £6 |

*These prices subject to change* (Carriage code d)



All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

**305 Edgware Road, London W2 Tel: 01-723 0233**

## PRINTERS

**EPSON**

| | | | |
|---|---|---|---|
| **LX800** | £165(a) | **LQ500** | £265(a) |
| **FX800** | £295(a) | **LQ850** | £415(a) |
| **FX1050** | £349(a) | **LQ1050** | £569(a) |
| **EX800** | £399(a) | **LQ2550+** | £919(a) |
| **EX1000** | £530(a) | | |

**GQ3500 Laser Printer** £1249(a)

| | | | |
|---|---|---|---|
| **TAXAN KP815** | £155(a) | **TAXAN KP915** | £275(a) |

**Star LC10** £179(a)
**Star LC10 Colour** £225(a)
**Star LC24-10** £275(a)
**NATIONAL PANASONIC**
**KXP1081*** £145(a)
***(*includes Wysiwyg ROM + Master Lead)***
**Canon Laser LBP8-II** £1595(a)
**Brother HR20 Daisy Wheel** £349(a)
**Juki 6100 Daisy Wheel** £295(a)
**Integrex Colour Inkjet** £529(a)

## PLOTTERS

**Hitachi 672XD** A3 4 Colour HPGL **£479(a)**
**Plotmate A4S** **£379(a)**
**Plotmate A3M** **£549(a)**
**Roland 880** A3 Flat bed 8 col **£575(a)**
Variety of Plotter pens and accessories in stock.
*Larger Plotters available. Please enquire.*

## PRINTER ACCESSORIES

**SERIAL INTERFACES**

| | | | |
|---|---|---|---|
| Epson 8143 | £32(d) | Epson 8148 (8K buffer) | £79(d) |
| Nat Pan KXP17 | £39(d) | Taxan | £49(d) |

**RIBBONS**

LX80/86/800, MX/RX/FX80/85/800/850 **£4(d)**
MX/RX/FX100, FX105/1000/1050 **£6(d)**
LQ500/800/850 **£5(d)**
LQ1000/1050, EX800/1000 (Black) **£8(d)**
EX800/1000 **£16(d)**
LQ2550, JX80 **£13(d)**
StarLC10/NL10, NatPan KXP1081 **£4(d)**
LC10 Colour **£6.50(d)**
Taxan 810/815/910/915 **£5.75(d)**
Integrex Black Cartridge **£8(d)**
Integrex Colour Cartridge **£14(d)**
Juki 6100 **£1.80(d)** Brother HR15/20 **£4(d)**
HI80 Pens (4) (Aqueous or Oil Based) **£6.90(d)**
Hitachi Pens (6) Aqueous **£18.50(d)** Oil **£25(d)**
Colour option EX800/1000 **£35(d)**

**CUT-SHEET FEEDERS**

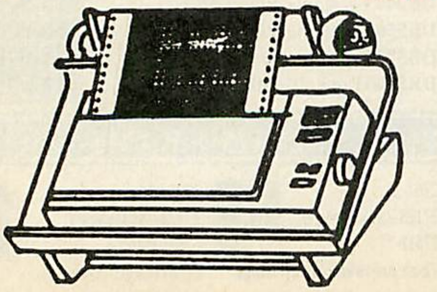
| | | | |
|---|---|---|---|
| LX800 | £70(b) | LQ500 | £75(b) |
| FX/LQ/800/850 | £135(b) | FX/LQ1000/1050 | £179(a) |
| EX800 | £150(b) | EX1000/LQ2500 | £210(a) |
| Star LC10 | £55(b) | Brother HR20 | £229(a) |

**TRACTOR FEEDS**

| | | | |
|---|---|---|---|
| LQ800 | £44(b) | LQ1000 | £55(b) |
| LQ850 | £70(b) | LQ1050 | £85(b) |

## PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**



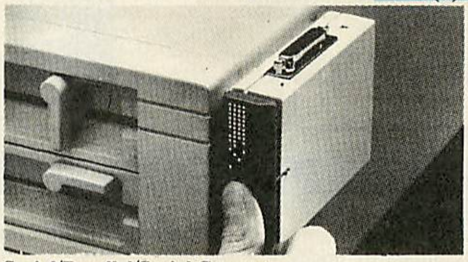
## PRINTER BUFFERS SHARER & CONVERTERS

**TSB 256 Auto Sharer/Buffer**
256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facitilies. Full spec on request. **£169(a)**

**Smart Printer Buffers**
Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.
For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port
PP256 256K Parallel buffer **£169(b)**
SS256 256K Serial buffer **£189(b)**

**Parallel Multi-Spoolers**
Allows connecting 2 printers to 2 or 4 computers Butter allows quick dumping of data to free the computers
COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR
MS422 4computers/2printers 512K buffer **£299(b)**
MS223 2computers/2 printers 512K butter **£199(b)**

**Compact Two Way Switch** 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



**Serial/Parallel/Serial Converters**
Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols
C-PS Parallel/Serial converter **£35(c)**
C-SP Serial Parallel converter **£35(c)**
***Add £49 to above prices for units with 64K butter***

**Manual Printer Sharers:**

| (All lines are switched). | Parallel | Serial |
|---|---|---|
| 2 computers to one printer | £23(c) | £23(c) |
| 3 computers to one printer | £30(c) | £30(c) |
| 4 computers to one printer | £36(c) | £36(c) |
| 2 computers to 1 or 2 printers | £49(c) | £49(c) |

***Cable sets for above sharers available for all popular computers***

**BBC Computer Sharer: TCS26**
1 computer to 2 printers fitted with BBC cable **£21(c)**

**Paper & Labels**
Plain fanfold paper with microperforation:
2000 sheets 9½ × 11″ **£12(£3.50)**
2000 sheets 14½ × 11″ **£18.50(£4.50)**
1000 Sheets A4 90gsm **£12(b)**
500 A4 80gsm Loose Sheets **£3.50(b)**

**Labels/1000**
Single Row 3½″ × 1 7/16″ (d) Triple Row 2 7/16″ × 7/16″ **£5(d)**
OHP Transparencies A4 (100) **£56(b)**

**PARALLEL PRINTER LEADS**

| | | | |
|---|---|---|---|
| BBC/Master (1.2m) | £5(d) | BBC/Master (2m) | £7(d) |
| Archimedes (2m) | £7(d) | Compact (1.2m) | £7(fd) |

## MODEMS

**MIRACLE WS4000 V21/23** **£129(b)**
**MIRACLE WS3000 V21/23** **£244(b)**
**MIRACLE WS3000 V22** **£379(b)**
**MIRACLE WS3000 V22 bis** **£495(b)**
**Pace Linnet** **£139(b)**
**(All modems are BABT approved)**
**BBC Data Cable for WS3000/4000** **£10(d)**
**MIRACLE WS2000V21/23** & **BELL stds** **£92(c)**

## MONITORS

### 12″, 14″ and 20″ MONITORS

**Microvitec 1431**
Std Res, 14″ **£175(a)**
**Microvitec 1431AP**
Std Res + PAL/Aud, 14″ **£199(a)**
**Microvitec 1451**
Med Res, 14″ **£225(a)**
**Microvitec 1451AP**
Med Res + PAL/Aud, 14″ **£219(a)**
**Microvitec 1441**
Hi Res, 14″ **£359(a)**
**Philips 8833 14″ RGB**
Med Res, 14″, high contract screen, TTL/Linear input, Mono/Colour Switch Stereo Sound Input. Separate controls for brilliance and contrast. **£219(a)**
**Touchtec 501** **£239(a)**
**Acorn Philips**
14″ Colour Monitor **£199(a)**
**Microvitec 2030CS**
20″ Standard Resolution RGB/Comp Video **£380(a)**
**Microvitec 2040CS**
20″ High Resolution RGB/Comp Video **£675(a)**
**TAXAN SUPER VISION 620**
12″ Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**
**TAXAN SUPER VISION 625**
12″ Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**
**TAXAN 770+**
MultiSysnc Autoscan 14″, ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£449 (a)**
**NEC MultiSync II 14″**
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£459 (a)**
**ECM 5413 14″ Multisync Monitor**
Fully compatible with Archimedes IPC Systems. Complete with Tilt and Swivel. **£329(a)**

### MONOCHROME MONITORS

**PHILIPS 7752** NEW
14″ green screen monitor.
This is a new addition to the Philips' popular mono monitors. Features include Flat screen, Inverse video switch, separate brilliance and contrast controls. **£85(a)**
**PHILIPS BM 7502**
Hi Res green screen **£72(a)**
**PHILIPS BM 7522**
Hi Res amber screen **£79(a)**
Tilt & Swivel Stand for Philips Mono **£6(c)**

### MONITOR ACCESSORIES

Microvitec Swivel Base
(14″ plastic monitors) **£17(c)**
Monitor Stand Models B & B+ **£10(c)**
Monitor Stand Master **£13(c)**
Double Tier Stand Models B, B+ or Master **£24(b)**
Taxan RGB Lead **£7(d)**
Microvitec Lead **£4(d)**
Monochrome BNC/Phono Lead **£4(d)**
Copy Holder Self Supporting A4 **£15(c)**
General purpose tilt and swivel stand for 12″ and 14″ Monitors NEW **£12(b)**

# TECHNOMATIC

Techno House 468 Church Lane, London NW9 8TQ. Tel: 01-205 9558 Fax: 01-205 0190

## Archimedes SOFTWARE

### LANGUAGES & PROG. TOOLS

- ANSI C/ISO PASCAL/ FORTRAN 77 — each £95(c)
- PROLOG X/LISP — each £175(b)
- TWIN Editor — £27(d)
- Archimedes Assembler — £185(b)
- Software Dev. Toolbox — £185(b)
- RISC BASIC Compiler (SV) — £85(c)
- Clares Toolkit £32(d) Clares Toolkit+ £41(d)

### WORD PROCESSORS

- First Word Plus £79(c) GraphicsWriter £27(d)
- Pipedream — £89(c)
- Pipedream Spellchecker — £43(d)

### SPREADSHEETS

- Logistix £95(c) Sigmasheet £59(c)

### ACCOUNTING SYSTEM

- Minerva's Suite — each £54(d)
  (Order Processing/Sales Ledger/Stock Manager/ Purch. Ledger/Nom. Ledger)

### EMULATED PACKAGES

- VIEW/Viewsheet/Viewstore — each £47(d)
- Interword/Intersheet — each £35(d)
- Wordwise — £20(d)

### GRAPHICS/ART/CAD

- ProArtisan £145(b) Artisan £30(d)
- Artisan Support Disc — £17(d)
- Auto Sketch — £69(d)
- GammaPlot — £30(d)
- System Gamma+ — £59(d)
- Presenter £24(d) SVARC-PCB £167(b)
- SVSolidCAD £41(d) SVSuperDump £20(d)
- SV Real Time Solids Modeller — £75(c)

### GAMES

- Hoverbod/Missile Control — each £13(d)
- Orion/Freddie's Folly — each £13(d)
- Zarch £15(d) Conqueror £24(d)
- Enthar Seven £29(d) Minotaur £9(d)
- Clares 3 Game Pack — £12(d)

### DATABASES

- Deltabase — £26(d)
- System Delta Plus — £59(d)
- Prog Ref Guide — £26(d)
- AlphaBase — £39(d)

### MISCELLANEOUS

- PC Emulator — £79(d)
- HEARSAY Comms Package — £55(d)
- MAYA Terminal Emulator — £49(d)
- Control (setup utility) — £13(d)

## BBC FIRM/SOFTWARE

### INTEGRATED PACKAGES

- MEGA 3 ROM — £76(c)
- MINI OFFICE II
  - Disc for Model B & B+ — £14(d)
  - Disc for Master — £16(d)
  - Disc for Compact — £19(d)
  - ROM Version (B,B+, M&C) — £43(c)
  (For disc version pse specify 40 or 80T)

### UTILITIES

- Acorn ADFS ROM — £26(d)
- Acorn GXR GRAPHICS ROM — £20(d)
  (please specify B or B+)
- PRINTMASTER — £24(d)
- DUMPMASTER — £26(d)
- SCREEN PRINT — £25(d)

### DATABASE MANAGEMENT SYSTEMS

- VIEWSTORE — £36(d)
- STARdataBASE — £29(d)
- ACORN OVERVIEW — £65(b)
  (Specify if Compact)
- INTERBASE — £49(d)

### DRAWING PACKAGES

- AMX MOUSE with SUPER ART — £59(c)
- STOP PRESS (Pagemaker) — £37(d)
  (pse specify B, B+, Master or Compact)
- EXTRA EXTRA £19(d) MAX £14(d)
- Stand Alone Mouse — £34(c)
- MARCONI RB2 TRACKER BALL
  - with ICON MASTER (B, B+ Master) — £59(c)
  - with CURSON CONTROL ROM (M) — £59(c)
  - Stand Alone — £45(c)
  (Specify if AMX compatible version)
- Cursor Control ROM (M) — £10(d)
- SV Solids CAD — £41(d)

### WORD PROCESSORS

- Acorn View Professional — £50(c)
- VIEW 2.1 £35(d) VIEW 3.0 £45(c)
- Double VIEW (ROM) — £20(d)
- Double VIEW (Disc) — £15(d)
- View Printer Driver Generator — £8(d)
- WORDWISE — £24(d)
- WORDWISE PLUS — £38(d)
- INTERWORD — £36(d)
- EDWORD II — £39(c)
- WYSIWYG Plus — £15(d)
- SPELLMASTER — £42(d)
- SPELLCHECK III — £25(d)

### LANGUAGES

- META ASSEMBLER — £90(b)
- META DISASSEMBLER — £90(b)
- ACORNSOFT C — £29(d)
- ACORN MICROPROLOG — £50(d)
- ISO PASCAL — £51(c)
- ISO PASCAL SAG — £30(d)
- OXFORD PASCAL (for B or B+) — £32(d)
  (pse specify 40 or 80 Track)
- OXFORD PASCAL for Master — £49(d)
- LOGOTRON LOGO — £49(c)
- Advanced BASIC Disc — £12(d)
  (for B, B+ or Master with 2nd Proc)

### COMMUNICATIONS

- TERMULATOR (BBC B or B+) — £25(d)
- TERMULATOR (Master) — £35(d)
- MAYA TERMINAL EMULATOR — £49(d)
- COMMSTAR II — £28(d)

### SPREADSHEETS

- VIEWSHEET — £36(d)
- WINDOMATIC (A VIEWSHEET UTILITY) — £15(d)
- INTERSHEET — £37(d)
- INTERCHART (A GRAPHICS UTILITY) — £25(d)

## BBC PUBLICATIONS EDUCATIONAL SOFTWARE

### PRIMARY EDUCATION

- Astronomy — £8(d)
- Computers At Work Aud/Disc — £16(c)
- Picture Craft — £17(d)
- Introducing Geography — £15(d)
- Maths with a Story I Cass — £5(d)
- Maths with a Story II Cass — £5(d)
- Number Games Cass — £5(d)
- Using Your Computer Cass — £24(d)
- The Hall of Mirrors — £13(d)
- Geordie Racer — £12(d)
- Bird Spy — £8(d)
- Maths Aud/Disc — £12(d)

### SECONDARY LEARNING

- Technology & Design Pt 1 — £21.50(c)
- Electric Fields — £8(d)
- 'A' Level Statistics — £19(d)
- 'A' Level Geography — £13(d)
- Inside Information Prog/Cass — £10(d)
  - Book — £8(d)
  - Aud — £5(d)
- Open Learning Pack D/Aud/Bk — £36(b)
- Science Topic (ST): WAVES — £7(d)
- ST: RELATIONSHIPS — £7(d)
- ST: BONDING — £7(d)
- ST: ElecMag. Spectrum — £7(d)
- ST: Electronic in Action — £7(d)
- ST: Newton & The Shuttle — £9(d)
- ST: ECOLOGY — £9(d)
- ST: POLYMERS — £9(d)
- ST: Classif. & Periodic Tab — £10(d)
- ST: Food & Population — £10(d)
- Sec Science (SS) Microtech — £7(d)
- SS: Mole Concept Disc/Aud — £10(d)

### GENERAL

- Vu-Type — £7.50(d)
- Vu-Type Professional — £19(d)
- White Knight Mk II — £16(d)
  (pse specify Compact or 1770DFS)
- Battlefields Cass — £5(d)
- A Vous La France Disc — £20(d)
  - Book £5.25(d) Aud (2) £7(d)
- Espana Viva Disc — £19(d)
  - Book £6.95(d) Disc/Aud (2) £7(d)
- Deutsch Direkt Aud — £16(d)
  - Book — £5.95(d)
- Black Queen (1770DFS) — £13(d)
- Bismark (1770DFS) — £13(d)

Codes: **Cass:** Program on Cassette
**Aud:** Audio Cassette
**Disc or no Code:** Program on disc
Above Programs are suitable for BBC Computers B, B+ & Master

## TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application programme. — £29(d)

**All software in this advertisement has been tested to work with appropriate Acorn Disc Filing Systems only and we are unable to comment on compatibility with any other filing system. It will be the buyers responsibility to verify such compatibility.**

***Technomatic is an authorised dealer & referral centre for Acorn Products.***

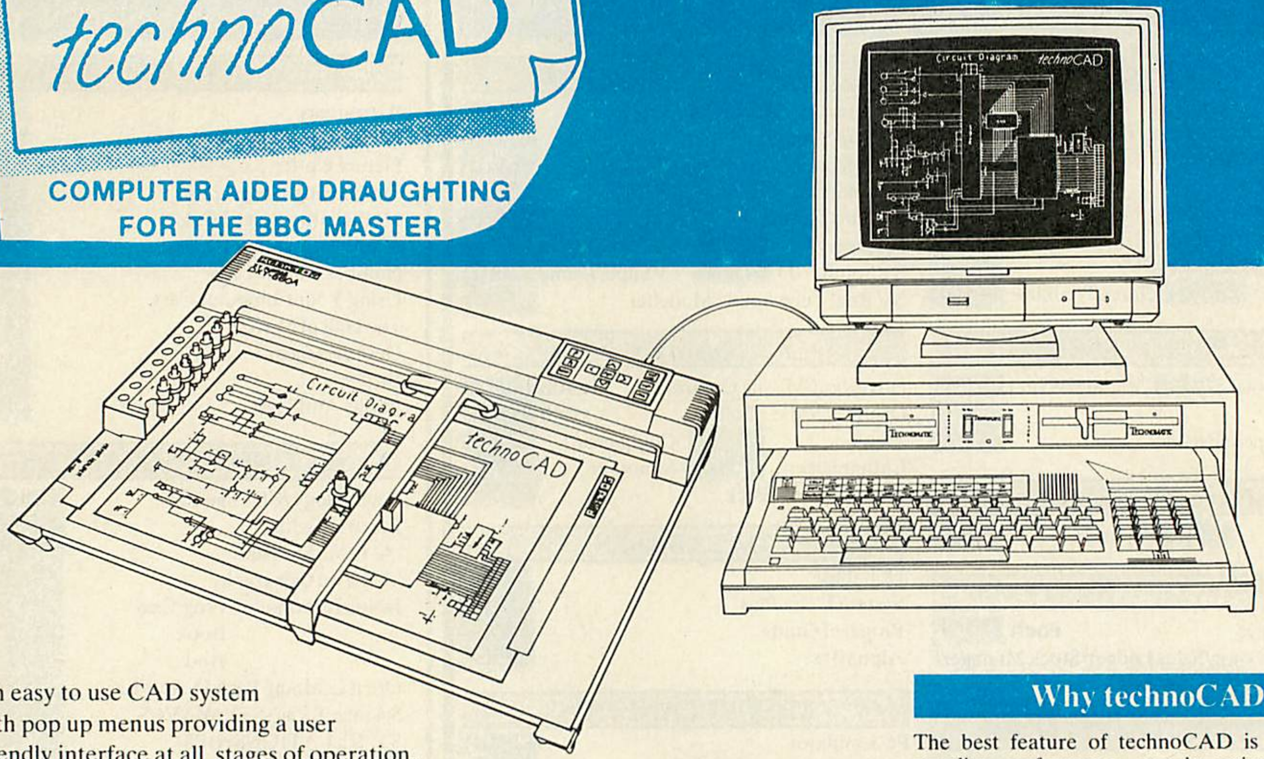

All prices ex VAT and subject to change without notice. See page 5 for Carriage Charges.

# TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

## technoCAD

**COMPUTER AIDED DRAUGHTING FOR THE BBC MASTER**

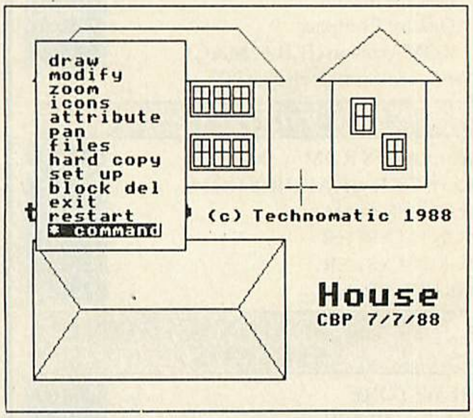



- ★ An easy to use CAD system with pop up menus providing a user friendly interface at all stages of operation.
- ★ Input can be configured for keyboard, mouse or tracker ball. Only three keys to input all commands if input from keyboard.
- ★ Virtually no limit to the size or complexity of the drawing that can be created. Powerful zoom facility allows a A0 size drawing to be viewed from single screen or a single screen can be enlarged to A0 size. Continuous panning across a drawing by specifying co-ordinates.
- ★ Lines, arcs and circles can be drawn with ease and in user defined colour and thickness. These can be modified at any stage of drawing.
- ★ User definable grid and scale, together with on screen display of dimensions, and co-ordinates enable easy and accurate drawings.
- ★ Multi layering capability with 8 levels allows superimposition of drawings.
- ★ Powerful icon utility allows any shape or drawing to be saved to a library as an icon. Icons can be recalled from the library and placed anywhere on the screen drawing at required scale and orientation.
- ★ Toolkit program allows customisation of files, utilities and peripherals.
- ★ Drawings can be scaled on screen to suit the plotter or printer in use. A maximum resolution of 0.01mm is available. Pre-configured drivers for many popular plotters and a driver generator for any BBC compatible plotter is included. Printer drivers for Epson 9 pin and 24 pin printers are included as standard as is the facility for installing drivers for other printers. Printers will output in landscape or portrait format.

**FREE EVALUATION DISC AVAILABLE**
**Phone for your copy**
**£99(c)**

### Why technoCAD

The best feature of technoCAD is not its outstanding performance, not its unique ability to allow creation of complex icons, not the quality of output from printers or plotters. The best feature is the unprecedented ease with which it can be mastered. With easy to use single key commands limited to three keys, pull down menus and a clear and concise, easy to read manual, technoCAD is truly the system any one can use.
technoCAD will meet the needs of most professional applications and is an ideal tool for teaching CAD in technical schools, CDT departments and colleges.




## BOOKS

**No VAT Carriage Code (c)**

**LANGUAGES**

| | |
|---|---|
| 6502 Assy Lang Prog | £10 |
| 6502 Programming | £8 |
| 8086 Book | £23.95 |
| Acorn FORTH | £8 |
| Acorn LISP | £8 |
| Acorn ISO Pascal Ref Manual | £8 |
| BASIC ROM User Guide | £9.95 |
| 30Hr BASIC | £7.50 |
| Intro to COMAL | £8 |
| Master Reference Manual I | £14 |
| Master Reference Manual II | £14 |
| Micro Prolog Ref Manual | £8 |

**BBC MICRO GUIDE BOOKS**

| | |
|---|---|
| Inside Information | £8.95 |
| Maths Prog in BBC Basic | £5.95 |

**ARCHIMEDES**

| | |
|---|---|
| Archimedes Reference Manual | £29.95 |
| Arc. Assy. Lang. Prog. | £14.95 |
| Inside Autosketch | £12 |

**PROGRAMMING/UTILITY**

| | |
|---|---|
| Advanced Sideways Ram User Guide | £8 |
| Advanced User Guide (BBC) | £15.95 |
| New Advanced User Guide | £19.95 |
| Assy. Lang. Prog. BBC | £10.50 |
| Mastering Assembly Code | £6.00 |
| Mastering Interpreters & Compilers | £10.00 |
| Master Operating System | £6.95 |
| Mastering View, Viewsheet & Viewstore | £8.00 |
| View by B. Smith Dabhand | £8.00 |
| View 3.0 Manual | £8.00 |
| Viewstore Manual | £8.00 |
| Viewsheet User Guide | £8.00 |
| Wordwise Plus | £5.00 |
| Understanding Interword | £5.00 |

**SOUND & GRAPHICS**

| | |
|---|---|
| Computer Graphics & CAD Fundamentals | £5.00 |
| Mastering Music | £5.00 |

**DISC DRIVE SYSTEMS**

| | |
|---|---|
| Advanced Disc User Guide | £15.00 |
| Disc Programming Techniques | £7.00 |
| File Handling on the BBC | £7.00 |
| Practical Disc File Techniques | £4.00 |
| Mastering the Disc Drive | £5.00 |
| Mastering DOS plus | £9.00 |

**APPLICATIONS**

| | |
|---|---|
| The Software Business | £2.50 |

# TECHNOMATIC

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Techno House
468 Church Lane
London NW9 8TQ.
Tel: 01-205 9558
Fax: 01-205 0190

RETAIL SHOPS
468 Church Lane, London NW9 8TQ.
Tel: 01-205 9558 Fax: 01-205 0190
(close to Kingsbury ⊖ )
West End Branch
305 Edgware Road, London W2
Tel: 01-723 0233, 01-402 0444
(near Edgware Road Tube) ⊖)

For fast delivery telephone your order on 01-205 9558 using VISA/Access Card

Orders welcome from government depts & educational establishments

All prices ex VAT
Prices are subject to change without notice
Please add carriage
(a) £8.00 (Courier)
(b) £2.50
(c) £1.50
(d) £1.00

## PC COMPATIBLE BOOKS

| | |
|---|---|
| Using SMART | £22.45 |
| Using Symphony 2nd Ed | £22.45 |
| Advanced Techniques dBASE III+ | £22.95 |
| dBASE III Plus Prog Tips/Tecs | £16.95 |
| dBASE III+ Handbook 2nd Ed | £19.95 |
| dBASE III+ Progrmg Tips & Techniques | £16.95 |
| Mastering dBASE III+ | £22.95 |
| Understanding dBASE III Plus | £19.95 |
| 123 Tips Tricks & Traps | £18.45 |
| ABC's of 123 | £15.95 |
| Mastering 123 (2nd Ed.) | £24.95 |
| Using 123 Special Edition | £21.95 |
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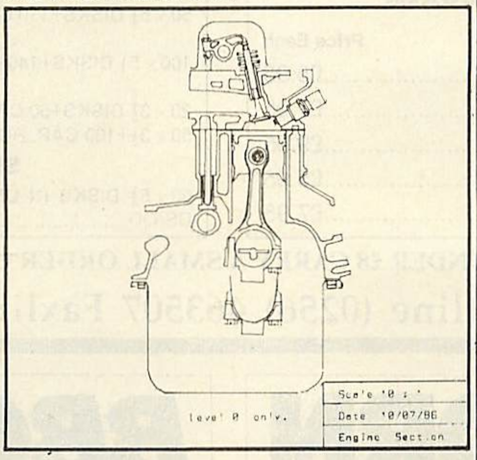
Full details on request. This is what Acorn User had to say about the assembler.

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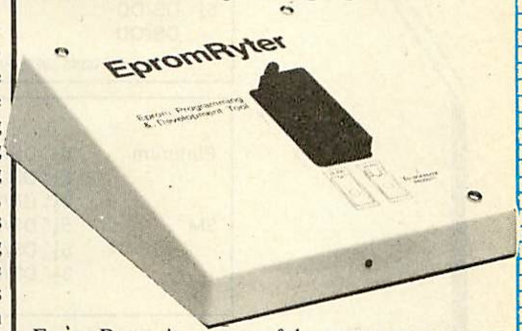
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# HINTS & TIPS

# IN DRAWING MOOD

**Drawing in mode 7, a Basic line editor, some nice utilities for BBC and Electron micros and much more**

***David Atherton***

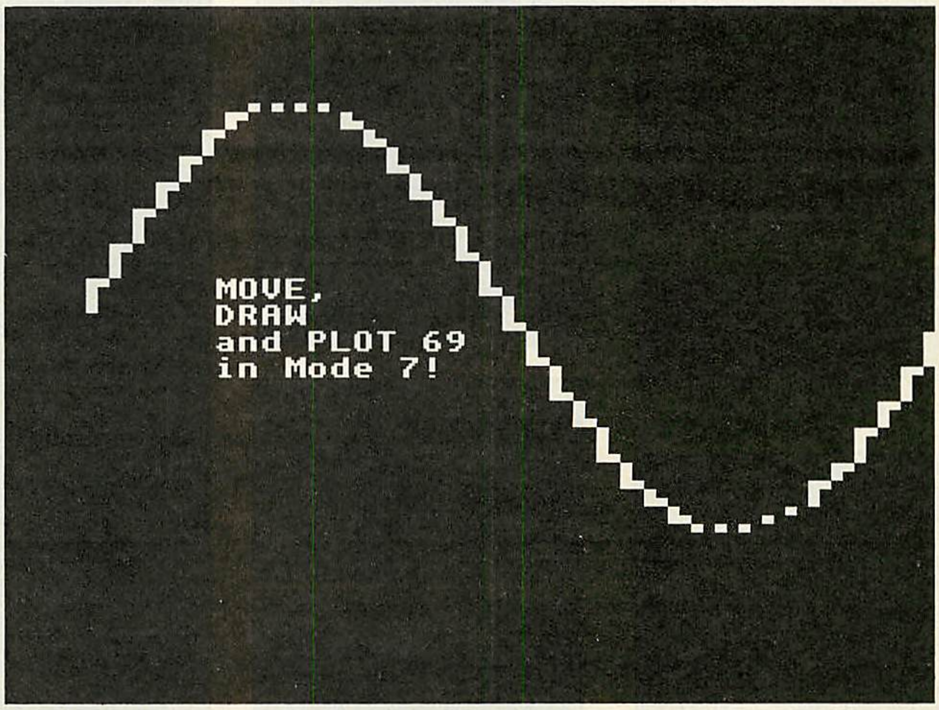
Andrew Piskozub from Bradford has produced a useful piece of code which should be a great bonus for anyone writing Viewdata editing packages, or other mode 7 graphics. The program allows the use of the standard Move, Draw and Plot 69 (plot a point) commands in mode 7, plotting the graphic dots and lines using standard teletext graphics, at a resolution of 76 pixels across by 75 pixels down. The program deliberately starts plotting from the fourth character position in from the left (this is why it has a resolution in the x-axis of only 76 pixels), leaving the first three characters on each line for setting a background and foreground colour. The plotting program simply works out the correct pixels to plot – it assumes that the relevant section of the screen has already been set to a graphics colour.

To use the program, type in the listing from the yellow pages, which creates a file called Grmode7. This should be *Run when you are in mode 7, but before trying to plot anything. Once installed, the screen must be set up with the appropriate foreground and background colours using the graphics colour codes, at the beginning of each line. If you are using a black background, simply set the foreground colour by printing the correct graphics code at the beginning of each line:

```
VDU 30
FOR I%=0 TO 23
PRINT CHR$ 145
NEXT
```

will set the whole screen to red graphics. If you require a foreground and a background colour, the necessary characters are background colour;CHR$ 157;foreground colour. So if the third line of the listing above is changed to:

```
PRINT CHR$145;CHR$157;CHR$150
```




**Each line can have a different background and foreground colour**

plotting would be done in cyan graphics on a red background. You can of course have a different foreground and background for every line, or change colours partway across the line, as long as you do not change at the same point where a pixel is plotted – the codes to change colour take up a character space, which would overwrite any pixels plotted in that space (or the pixel would overwrite the colour change).

Note that the routine expects to find an unscrolled mode 7 screen, as it directly accesses screen memory for extra speed. If you scroll the screen, you get the usual effects that direct writing causes – plots go off the top of the screen and reappear at the bottom.

Note that the program also supports resetting of the graphics origin using the normal VDU 29 command. Also VDU 18, GCOL, is supported to a limited extent – the AND, OR and exclusive OR plotting modes are supported. But colour changes are almost ignored. GCOL 0,0 plots pixels in the background colour, and any other colour value causes pixels to be plotted in the colours set at the start of the line on screen. Similarly, the Point command (Osword 9) is supported, but you can only tell if a pixel is absent (returns colour 0) or present (returns colour 1). You can't tell what colour that pixel is.

A useful side-effect of the direct screen writing approach is that the program ignores any mode 7 text windows set. When setting up mode 7 graphics, one of the problems is that typing in a command causes the screen to overwrite the graphics characters at the left-hand side. By setting a small text window at the bottom of the screen with, say, VDU 28,0,24,39,20, and resetting the origin with VDU 29,0;10; you can try out various commands directly. There's a

short demonstration at the end of the main machine code.

The program works by intercepting the VDU extension vector at locations &226/&227. This vector is called by the operating system if it is unable to process a VDU call, for example if you typed Plot with an unknown number. When in mode 7, all Plot or VDU 25 commands are normally disabled, and therefore all of them are passed through this vector.

Andrew's code first tests if mode 7 is selected, and if not, passes over the calls. The Osword vector at &20C is also intercepted to catch the Point command. The program then deals with PLOT 4 (Move), 5 (Draw) and 69 (Plot point), and calculates the appropriate screen location and pixel pattern within that location. Any other Plot commands are passed back out to the old vector.

The program occupies five pages of memory, and at present is assembled to locate immediately below the mode 7 screen area. HIMEM should be reduced to &7700 early in your program to avoid overwriting the code.

If you have sideways RAM, you may like to rewrite the program to exist in a sideways RAM environment. This will require more complicated vectoring code, but it should be possible using the advice of David Harper given in the March issue *BBC Acorn User*.

£10

## GENERAL PURPOSE LINE EDITOR

Barry Ambrose of Crosshaven, in Eire, has sent a nice machine code routine which provides a full line editor for Basic and many other input routines, and retrieves the last line typed for editing. This simple routine proves to be extremely useful in all sorts of applications.

To set up the program, type in listing 1 in the yellow pages, and run it. A machine code program called Retcode will be produced, and can be saved to disc. The program also creates a text file called Retline, which should be used to install the code – type *Exec Retline. The installation commands that Barry has provided are designed for Basic, as it installs the code at PAGE and then raises PAGE so that the code is not overwritten. If you're using the utility within a ROM-based program such as the *View* family, *Wordwise*, or the *Inter* series, then you can start from Basic, type *Exec Retline, and press f9 before typing *Word, *Sheet and so on.

Once installed, the program can be used at any point where a line of input is required, the command modes of *View* and *ViewSheet*, the colon (:) and star prompt, or at the INPUT point of any Basic program. When you are required to give input to any of these programs, you can press CTRL-f0, and the last line you typed in is repeated. When writing Basic programs, this is easier than copying.

If you have typed in a long line, and want to change something at the beginning, then you can use the line editor. Pressing CTRL-f1 causes the cursor to change shape, and you are now in Insert mode. Use CTRL-h and CTRL-i to move along the line, and any characters typed will be inserted into the text. The Delete key will delete within the line in the normal way. Pressing CTRL-f1 again turns off the insert mode. You can complete the entry of a line at any point while editing, just by pressing Return.

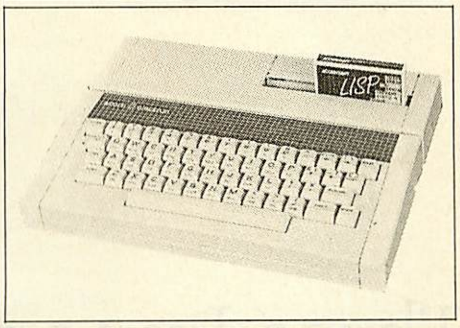
Uses of the program include repeating a slightly mistyped command or program name, or re-entry of standard text responses to a prompt in a Basic program. The program only works where standard line input is expected. It will not work within wordprocessors, or Basic single character functions such as GET and INKEY$.

The program works by intercepting the Osword 0 call, the standard line input procedure within the operating system. The first part of the code redirects the Wordv vector to Barry's code, which is then tested on entry to see if A=0. If not, the normal Osword vector is called. If it is, Barry's alternative code is invoked. A complete alternative implementation of Osword 0 is provided. Every command you type in is stored so that it can be recalled the next time. The insertion system is fairly straightforward, and avoids the need to use key translations – as CTRL-h and CTRL-i generate the Ascii codes 8 and 9 which are left and right cursor movement codes.

Note that the code as it stands is not ideally situated in memory. As it occupies four pages of memory, it can't be put at the usual &900 address, unless you are using a Master 128 or Compact. It could however be rewritten slightly to run in sideways RAM. Barry has also used some locations in the Econet workspace &90-&9F, which should be altered if you are running the utility from a network.

£5

## ELECTRON EXTENDED FUNCTION KEYS



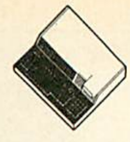
**More function keys for the trusty Electron**

Brian Ross from Glasgow has provided a program to help Electron *View* family users. On the BBC micro, four levels of function keys are provided – normal, with Shift, with CTRL and with both Shift and CTRL. The first three levels are used by *View*, and the fourth, when enabled with *FX228,1 can be used for preprogrammed strings (using the normal *Key command). Type *FX228,1 as soon as you start *View*, then *Key 0 "Yours sincerely" will cause that phrase to be printed out every time you press CTRL-Shift-f0 in edit mode. This feature is not available on the Electron, but Brian's program provides it. The normal *View* functions on the Electron are provided by using the Func key, plus a number key, with or without the Shift and CTRL keys. But, no special use is made of the CTRL key on its own. Brian's routine tests if only the CTRL key is being pressed – that the Shift and Func keys are not pressed – and if so, then the key code equivalent to CTRL-Shifted function keys is generated, and any *Key string set up as above is generated.

To use the program, type in the listing in the yellow pages, and run it. This will create a machine code program called Xfkeys, which can be saved to tape or disc, and *Run before using *View*. After running, the effect is present in any language until you press Break. The code occupies memory in page &9, the usual place for this type of utility. But it can run elsewhere, by changing the assembly address of the code in the listing.

Besides plain text strings, another use of this level of function keys (on Electrons and on BBC micros) is to build up *View* macro commands, by setting up strings including the character codes equivalent to the relevant normal function keypresses. For example, to delete a





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word in *View*, you would move your cursor to any point in the word, then type the sequence: right-arrow, Shift-left arrow (beginning of word) Shift-f3 (delete to char), Space. You might do it another way, but these four keystrokes always work from any position in the word. The code for CTRL-left arrow is &B8, and the code for SHIFT-f3 is &9F. As you probably know, key codes above 128 are defined in function keys using the GSREAD format, and so the command to define these two commands, followed by Space and Delete would be

```
*KEY0 "|!B|!|_ |?"
```

Similar commands can be constructed, using markers if necessary to perform other tasks such as 'Delete to beginning of line', 'Delete marked line' and others that aren't already built into *View*.

The program works in a very simple manner. The CTRL key alone normally has no effect, resulting in the standard Ascii codes for 0-9 being output whether the key is pressed or not. The desired Shift-CTRL-function key codes are exactly 128 greater than the standard number codes, so the program simply intercepts Insv and tests (using negative Inkey) whether CTRL (alone) is being pressed, and if so, adds 128 to the value of the key. This inevitably prevents output of Ascii character zero from the keyboard (normally its CTRL-0), so a special case has been put in, so CTRL-colon produces a zero code.

£10

## NOT LOST IN SPACE

Brian Ross from Glasgow has provided yet another excellent utility for the BBC and Electron micros, this time to overcome the problem associated with having more than 32 user-defined characters.

As most programmers will know, the first block of 32 characters are stored in memory at &C00, but if further characters are required, extra space has to be reserved with the *FX20 command, and that eats up quite a lot of user memory. What is even worse, however, is that Basic does not 'know' about this extra area, so PAGE has to be manually raised to leave space for the character definitions, before you load any programs.

Brian's particular concern is that many of the programs written for the Master series micros, or model B's with shadow RAM just will not run on his Electron, because of the space required for character definitions. He thought that it would be much better if the definitions could be kept in sideways RAM, and so wrote a program which will work on the Electron and BBC B or B+.

Brian's program is written in the form of a ROM image, and you must have 16k of sideways RAM present on your machine to use it. Load and run the program listed in the yellow pages, which will assemble the image and save it to disc. This should then be loaded into sideways RAM using whichever method you normally use to install ROM images. Then press CTRL-Break to initialise the ROM.

When installed, you can define any number of new characters using VDU23 without worrying about *FX20. You will find that the definitions are successfully stored, with no loss of user memory. This month's monthly disc has a bonus file that contains character definitions so that your Electron or model B can use the same character set as the Master 128 as well as simple lines and boxes.

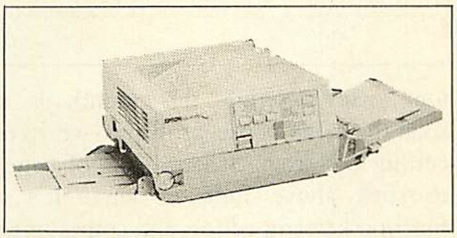
The program works initially at hard break by copying the ROM definitions of characters 32 to 127 from the operating system into sideways RAM, and setting the font flags in page 3 to point to the sideways RAM definitions.

However, the system also needs to be told which ROM bank contains the sideways RAM definitions, otherwise the OS would just read the address from whichever ROM was selected at the time – normally the Basic chip. So an extended vector system is used – this works on the principle that if OS routines are vectored through our character ROM, and immediately passed back to the OS, then while the routine is being executed, our ROM will be regarded as the calling chip, and therefore the character definitions will be 'visible'.

Not all OS routines need to be redirected, only those which may read or produce a character. These are:

Oswrch (all OS routines use this)
Osword A=0 (needed for copying)
Osword A=10 (reading definitions)
Osbyte A=129 (reading key – because copying may occur)
Osybte A=135 (read character at cursor position)

Therefore extended vectors are set up for Oswrch, Osbyte and Osword, but only the calls listed are actually intercepted. Because Brian found difficulty with standard extension of the Osword vector on his Electron with Pres, ADFS vl.27, a more complex method has been used. Osword is sent to a routine in main memory, which translates calls with A=0 and A=10 into calls with A=29 and A=30 respectively. This creates an 'unknown Osword' which is picked up by Brian's ROM. The handler code in main memory from &D80 to &D92 isn't used in Brian's machine. However, you can alter this area by changing the variable 'oswpos' if you have trouble. Another suggested address is &380, the cassette system workspace, which is unused on disc-based machines.



**The Epson GQ3500 has built-in margins**

## SKIPPING THE DOTTED LINE

Some printers are set to skip over the area of perforation between pages. That means when you print a Basic listing (LIST, CTRL-B, Return...CTRL-C), it doesn't go over the fold between sheets.

But a printer set like this causes problems in *View* because the 'page length' isn't the same as it should be. Normally it's six times the length of the paper in inches (so 11inches = 66 lines). But with 'skip over perforation' set, it's only 60 lines. In *View*, you can set PL60, so only 60 lines per page are printed. But this then gives you giant margins at the top and bottom of each sheet. You can reduce this with TM1 and BM1. *View* normally assumes TM4 and BM4 if you don't tell it otherwise.

Effectively, the perforation skip adds an extra three lines each to the top and bottom margins, so TM1 really looks like a normal sized four-line top margin.

Incidentally, most laser printers can't print on the whole page – they have a built-in margin too. Qume's Script Ten puts only 64 lines on each page of A4 with a four line margin top and bottom.

# ARC AGORA

## MASTER KEY STRIPS

**A keystrip routine that will also run on your Master, speeding up your ROMs and easy text editing**

***David Acton***

| | | | |
|---|---|---|---|
| Examine Files | Auto/ Manual Split | Display Format | Kern |
| Run Subtitles | Load Subtitles | Save Subtitles | Edit Info |

| | | | |
|---|---|---|---|
| Split at Cursor | Fix Timecode Offset | | |
| Go to Box | Insert | Delete | Full size On/Off |

| | | | |
|---|---|---|---|
| | | | |
| Set IN t/c | Set OUT t/c | Auto-Enter t/c | Clear |

Our main offering this month is a solution to all those problems we have cutting out strange-shaped bits of paper to stick above function keys. It's a function keystrip editor, and comes to us from Terry Blunt of Berkshire. He gets a crisp £20 for his trouble. Terry's program is listing 1 on the yellow pages.

The operation of the program is fairly simple. On the screen 12 boxes are displayed – one for each red key. Simply type the text you want into the boxes, moving the cursor around using the cursor keys. To move between boxes, use Shift with the cursor keys. In addition, you can use Delete to remove the last character typed, and Return to skip to the start of the next line in a box.

Each box can hold up to six lines of 11 characters each, and four keystrips can be edited at a time. The number of the current strip is shown on the right of the screen; press f4 to select another.

The function keys themselves provide extra facilities and these are shown on screen beneath the boxes. Most should be self-evident – f5 inserts or removes a divider within the box. Because each box is six lines deep, dividers may be used to split a box up into two or three areas depending on whether the application requiring the keystrip makes use of Shift plus the functions keys and CTRL plus the function keys.

Terry's editor deals with four strips at a time and so f2 and f3 load and save four strips respectively. Press f9 to do a star command, and f1 will clear the current strip. f6 copies another strip onto the one currently being edited. Each keystrip can have it's very own title; simply type this in by pressing f8. The title consists of two words (each up to 11 characters long) which are placed centrally over the keystrip.

An important feature of listing 1 is that it can also be run on Masters or Master Compacts, as well as on the Arc. In fact, the program should work on a standard Beeb with shadow memory too or on a 6502 second processor. Because the program is 9k long and requires mode 0 graphics, it won't fit in an unexpanded 32k machine though.

The program is designed for use with an 8-pin Epson-compatible printer. Keystrips are printed out sideways, and you can print up to four side-by-side at a time. Terry has designed his own small 'sideways' character set, so that presentable dumps can be made with up to 66 characters in each box. Printing can take a little time, so try and get it right on the screen first.

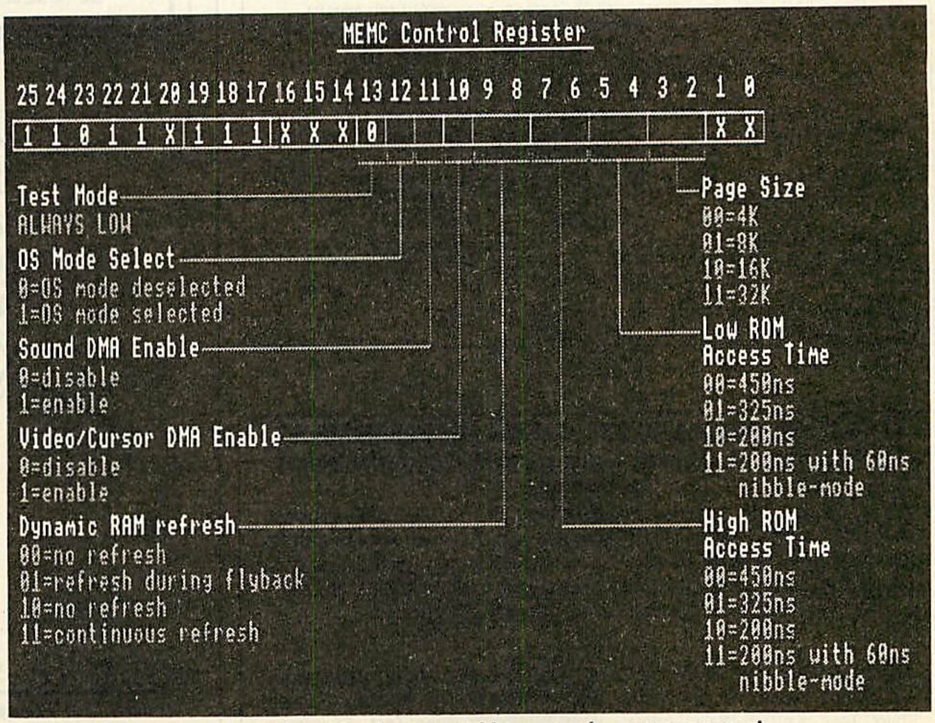
If you have a 24-pin printer, then there is some good news and some bad news. The bad news is that for some reason, the printer sequence "ESC 3" (that is VDU 1,27,1,51) selects line spacing in 180ths of an inch on 24-pin printers, and in 216ths of an inch on 8-pin printers. The good news is that a small change to the listing will make it work. In PROCinit, two variable assignments need to be changed: wide%=11 should become wide%=9, and gap%=41 should become gap%=38. The variable wide% holds the maximum number of characters across each box.

This alteration will of course reduce the number of characters you can put in the box, but this shouldn't be too much of a handicap. In fact, much better vertical resolution is available on 24-pin printers, and so I'd like to hear from any readers who can add a few lines to the listing to make sure of this. Another point to note is that keystrip titles should be restricted to words of nine letters or fewer with 24-pin printers.

And so to Master and Compact owners. Listing 1 will work without modification, but you might like to make one change so that you can design strips to fit on the Master or Compact instead – ones without gaps between the keys. All you need to do is place an ENDPROC immediately after DEF PROCgap, so that the gaps aren't printed. 12 boxes will still be printed, but you can snip off the last and use the first to put your title in. Don't bother entering a title using f8.

The main program should be fairly easy to follow. The characters entered in your keystrips are stored in the array main%, and much of Terry's program involves manipulation of this array. The array bars% contains details of any dividers you have put in the boxes.

Keys pressed in the range CHR$(32) to CHR$(126), are passed on to PROCinsert. This puts the character on the keystrip and moves the cursor. PROCcheck ensures that the cursor




**MEMC – the memory controller chip of your machine – can be reprogrammed**

doesn't move outside the limits of the boxes. Perhaps the most important procedure is PROCprint which actually sends the keystrips to the printer. Two Epson printer-code sequences are used to produce the hard copies:

```
VDU 1,27,1,5,1,n
```

sets the line spacing to n/216ths inch (or n/180ths inch on 24-pin printers). The sequence:

```
VDU 1,27,1,75,1,size%
MOD 256,1,size% DIV 256
```

tells the printer to expect size% bytes of graphics data. This selects the single-density graphics mode of Epson printers, and higher horizontal resolutions could be used if you modify the program, depending on the capabilities of your own printer.

**£5**

## RAPID ROMS

Next comes a £5 quickie from Jason O'Broin. Jason points out that the ROM chips on the Arc are normally accessed at a lower speed than they are capable of. By reprogramming the memory controller chip, MEMC, it is possible to speed up your machine a bit. Before you try it out though, here's a warning. Speeding up ROM access can't be guaranteed to work. It should only be tried out in a safe environment, when it doesn't matter if you crash your machine. In particular, don't try this trick if you have a hard-disc or some other sensitive device attached.

With that warning over with, the trick itself is very easy, and is thoroughly safe otherwise. To switch your ROMs to fast access use the call:

```
SYS "OS_UpdateMEMC",64,64
```

and to return to slower access use:

```
SYS "OS_UpdateMEMC",0,64
```

Using the test loop:

```
FOR i%= TO 100000:NEXT
```

I got a speed improvement on my machine from 1.69 seconds to 1.33 seconds. This may not be the same on yours of course, and indeed, it may not work at all – that's the hardware for you. Incidentally, the RAM in your machine is accessed at an even higher speed anyway, so you'll never be able to get ROM Basic to go faster than RAM Basic.

When you upgrade your machine with Risc OS, RAM Basic is no longer needed. Risc OS has a command *RMFaster, which copies a module from ROM to RAM and 'kills' the original ROM version. So ROM Basic can be copied into RAM where it was just like RAM Basic used to.

The SWI call 'OS_UpdateMEMC' reprograms the MEMC control reg-ister. This is a write-only register, but a RAM copy is maintained by the OS. The diagram above summarises the bits in this register. You will notice that ROM access times are split into two sections – low ROM and high ROM. This is primarily to allow ARM development systems to contain a mixture of fast ROMs (containing permanent code) and slower, cheaper EPROMs (containing code that may need to be changed during development).

Jason's call simply sets bit 6 of the control register, so reducing the access time. The 'OS_UpdateMEMC' call takes two parameters in R0 and R1. If old is the original value of the register, the new value is calculated like this: (<old> AND NOT R1) or (R0 and R1) R1 contains a mask in which you should set any bits you wish to change. The desired value of those bits should be put in R0. On exit, the old value is returned in R0. So you can read the register without altering it, use:

```
SYS "OS_Update,E,C",0,0
TO contents%
```

**£5**

## BOOT EASE

Perhaps the most common complaint I've heard about the Archimedes' welcome disc is that there's no text editor. Risc OS puts this right with *Edit*, I'm glad to say, but many have found their own ways of overcoming the problem. Some people use the notepad utility, while others resort to the *Basic Editor*. One such person is Martin Webb who gets a fiver for his tip.

Martin creates boot files by using simple DATA statements. An example of this is given as listing 2 on the yellow pages. This is made much easier by the enhanced BPUT command in Basic 5.

```
BPUT# file%,data$
```

writes the string data$ to a file, byte-by-byte. This is unlike PRINT# file%, data$, which writes the string in a backwards format. A new line (CHR$10) is appended to the end unless you place a semi-colon after the command. Strings can be read back in using GET$#.

Martin's program concludes by setting the type of the file to &FFF so it may be *Execed. All in all I'd rate the *Basic Editor* as just about the best editor there is for the Arc – of any type.

*Send your programs, ideas, hints and tips to; Arc Agora,* BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.*

# CO-PRO Adaptor




With this Watford's Co-pro Adaptor unit, you can now attach any BBC Master's coprocessors to your original BBC B.
Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.
With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.
To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.
Master owners may use Co-Pro Adaptor to add a second Co-processor externally.
Watford, brings power to your BBC at only:

**£35** (carr £5)

# REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

**£15** (40 or 80 track)

**Acorn's Speech Synthesiser package, complete**
**Special Offer £15**
**BBC B Micro only**

## Versatile **BEEB SPEECH SYNTHESISER** Unit




The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

**SPECIAL PRICE £32** (carr £2)

## VOLTMACE JOYSTICKS

| | |
|---|---|
| Delta 3B Single Joystick | £10 |
| Delta 3B Twin Joysticks | £15 |
| Delta 3C Joystick for Compact | £10 |
| Delta 14B Single Joystick | £11 |
| Delta 14B/1 Adaptor Module | £12 |
| Transfer Software Disc-Tape | £7 |

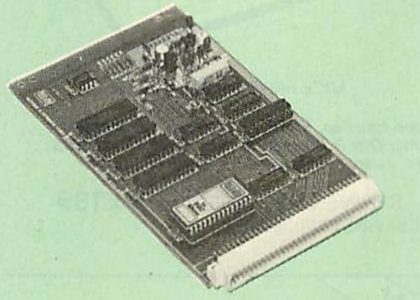
## ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

**By Popular demand we are now supplying refurbished and fully guaranteed BBC Micro Model B with Disc Filing System**

(Please telephone for price & availability)

# Archimedes Real-Time Digitiser



Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

**SOFTWARE**
All driver software for the digitiser is contained in a ROM on the podule. Software facilities are accessed via operating system star (*) commands and SWI calls. A Utility Disk is included containing sample pictures, examples and Utility programs.

**RESOLUTION**
Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

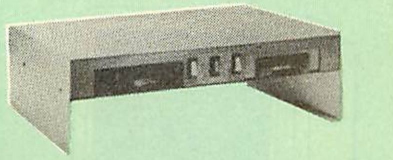
Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

**SPEED**
Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

**HARDWARE**
The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

**Price £249**

## Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

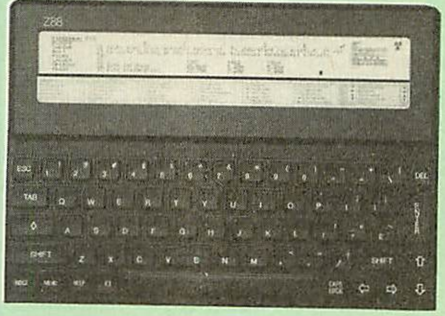
To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

# Z88 Sinclair's Portable Micro




The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 2lbs. Ideal for use when travelling or as a personal organiser.

Only: **£199**

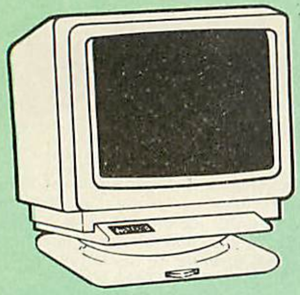
**FREE**
With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

## ACCESSORIES

| | |
|---|---|
| Mains Adaptor | £8.65 |
| 32K RAM Pack or 32K EPROM Pack | £17.35 |
| 128K RAM Pack or 128K EPROM Pack | £43.40 |
| 512K RAM Pack | £169 |
| Z88 Spellmaster for Pipedream | £51 |
| Z88 to BBC Link | £21.70 |
| Z88 to PC Link II | £30 |
| Z88 to Macintosh Link | £49 |
| Z88 EPROM ERASER | £34.75 |
| Serial Printer Cable | £8.65 |
| Parallel Printer Cable | £24.00 |
| Z88 Modem | £145 |
| Z88 Soft Carrying Case | £8.50 |
| Sinclair Z88 Computing Book | £9.95 |
| AA Nicad Rechargeable Battery | £1.50 |
| Battery Charger, Compact & Fast (3 Hours) | £6 |

Continued →

## MONITORS



**All Monitors are supplied complete with BBC connecting leads FREE.**

### MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme £175
- 1451 – Medium resolution, suitable for word processing in mode 0 £219
- 1441 – High res, exceeds the capabilities of the BBC micro £359
- 1431AP RGB + PAL and AUDIO £199
- 1451AP RGB + PAL and AUDIO £255
- **2030 CS 20" Med Res** £380
- **2040 CS 20" Hi Res** £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen £239**

### 14" MULTISCAN COLOUR

- **TAXAN** Multisync 770 Plus £449
- **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89 £439
- **EIZO** 9060S £458

### TAXAN 12"

- Super Vision 2 **Type 620** Hi-res RGB Colour, Green/Colour Switch £265
- Super Vision 3 – **Type 625** Super Hi-res RGB Colour, Green/Colour Switch £315

Taxan High Resolution MONOCHROME Monitors with long persistence tube to reduce flicker.

- KX117 Green £69
- KX119 Amber £72

### PHILLIPS

- BM7502 12" Hi-res Green Monitor £65
- CM8833 14" Med. Res Colour Monitor £219

### STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

**ONLY £199**

Dust Cover for Phillips Monitors £6

### SPARE LEADS

**BNC Lead for Zenith or Philips** £3
Skart Monitor Lead £5
RGB lead for TAXAN Monitors £3
Archimedes Colour Monitor Lead £7.50

## SWIVEL BASES

By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

for 12" Monitors **£8** (carr. £2.50)
for 14" Monitors **£12** (carr. £2.50)

## Anti-Glare VDU Screen

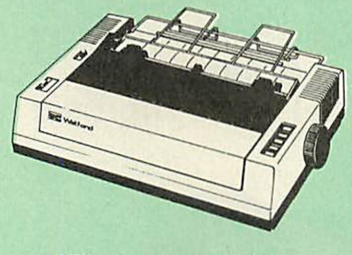
These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. **£12**

## TAXAN KP-815 PRINTER

### Offer Price £155

**Taxan KP915** 132 Column **£275**
RS232 Interface £49
RS232 Interface with 2K Buffer £69
RS232 Interface with 16K Buffer £89

## Panasonic KX-P1081



**UK's most popular printer.**

***(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).***

*SPRING SALE OFFER only:* **£139**
Optional RS232 Interface: £39

**NEW**

## Panasonic KX-P1124

Watford Electronics, your authorised Panasonic Premier Dealer, brings you from the prodigious Panasonic Stables, this fabulous 24-pin printer.

Available NOW at a superbly realistic price, KX-P1124 perfectly balances features, quality of construction and Value for Money to produce the printer of tomorrow, here today, ready to sweep the current generation of machines away.

Ingenious innovation in terms of software control codes permits great flexibility when it comes to defining the print style. A nippy 192 cps of clear draft speed backs up the crisp 60 cps Letter Quality text mode, with 6 fonts. A delightful range of assorted character width is efficiently supported, with sizes ranging from a broad 5 to petite 20 CPI, even in LQ mode. Some of the extensive support for serious use includes, justification, centering, left and right ranging and proportional spacing.

A full 96 ASCII character set is supported with an extended set of Italic, 32 International (13 countries) and 158 IBM special characters. A 6K Print Buffer alleviates much of the wait time normally associated with printing, whilst the bi-directional logic seeking (character & graphics), print head takes the quickest route to print as required.

Simple paper parking and easy front loading of A4 sheets add an extra dimension. Not only Epson LQ & IBM Proprinter emulation modes are implemented, but extra codes have been added to cater for LQ option.

At less than 53dB, this is perhaps the quietest dot matrix printer on the market.

Watford's Launch Offer: **£269**

### Panasonic Printers

- **KX-P1180** 9pin 80col. 192/38 CPS £169
- **KX-P1540** 24pin 80col. 240/80 CPS £435
- **KX-P1592** 9pin 136col. 216/45 CPS £275
- **KX-P1595** 9pin 136col. 288/61 CPS £409
- **Panasonic KX-P4450** LASER PRINTER Latest technology at Watford's special offer price £1,499
- Spare Toner £29 ● A4 Feeder £55

## INTEGREX COLOUR JET

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

NEW – Intergrex COLOURCEL NPQ Ink Jet Colour Printer £2,695

## NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc. **£269**

Pinwriter Serial Interface (optional) £55
P2200 Cut Sheet Feeder £65
Additional Font Cartridge £25
NEC P2200 Pinwriter Ribbon £6

## NEC PINWRITER P6/P7 Plus

| | | | |
|---|---|---|---|
| NEC P6+ 80 columns | £439 | NEC P7+ 136 columns | £575 |
| Colour Option | £74 | Serial Interface | £73 |
| Cut Sheet Feeder | £125 | | |

## Star Printers

| | | | |
|---|---|---|---|
| Star LC10 | £169 | LC10 Colour | £215 |
| Star LC24-10 | £279 | NB24-10 | £399 |
| LC10 Colour Ribbon | £6 | Cut Sheet Feeder | £65 |

**Brother HR20 DaisyWheel Printer** £339

## EPSON PRINTERS

| | | | |
|---|---|---|---|
| EX800 | £405 | LQ850 | £430 |
| EX1000 | £564 | LQ1050 | £570 |
| FX850 | £315 | LQ2550 | £925 |
| FX1000 | £425 | LQ2500+ | £839 |
| FX1050 | £439 | LX800 | £165 |
| LQ500 | £275 | SQ2500 | £975 |
| GQ3500 Laser | £1150 | | |

### PLOTTERS

Hitachi 672 Colour Plotter £475
Plotmate Plotter A4S £379
Plotmate Plotter A3M £549

### CUT SHEET FEEDERS for

EX800 **£149**; EX1000/LQ2550 **£210**; FX800 **£149**; FX1000 **£179**; LQ/LX800 **£139**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175**.

### TRACTOR FEED for

EX800/1000 **£85**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£85**; LQ2500 **£195**

### ACCESSORIES

- EX800/1000 Colour Option £55
- EX800/1000 Colour Ribbon £18
- LQ2500 Colour Option £65

**(Securicor Carriage on Printers £7**

## EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

| | | | |
|---|---|---|---|
| RS232 | £32 | RS232 + 2K Buffer | £52 |
| IEEE 488 | £40 | RS232 + 8K Buffer | £79 |

## PRINTER LEADS

BBC Centronics 4' long £5
BBC Centronics 6' extra long £7
Compact's Special Centronics Lead £7
Archimedes Printer Lead 1 meter £6
Nimbus Centronics Lead £12
IBM Parallel Lead 1 meter £6
Double Ended 36 way Centronic Lead 4' £7
Double Ended 36 way Centronics Lead 6' £9
MSX Centronics Parallel Lead 4' £12
RS232 Leads (Various) P.O.A.

## RS-232 GENDER CHANGERS

Male to Female £4.95
Male to Male £4.95
Female to Female £4.95
25 way Male to 9 way Female £4.90

## Listing Paper (Perforated)

| | |
|---|---|
| ● 1,000 Sheets 9½" × 11" Fanfold Paper | £7 |
| ● 2,000 Sheets 9½" × 11" Fanfold Paper | £12 |
| ● 1000 Sheets 9½" × 11" NCR 2 Part Fanfold | £19 |
| ● 1,000 Sheets 15" × 11" Fanfold Paper | £9 |
| ● 1000 Sheets true A4 Fanfold Paper 70gms | £11 |
| ● 2000 Sheets true A4 Fanfold Paper 70gms | £19 |
| ● Teleprinter Roll (Econo paper) | £4 |

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

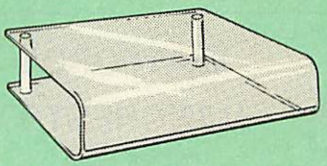
## PRINTER LABELS

**(On continuous fanfold backing sheet)**

| | |
|---|---|
| 1,000 90 × 36mm (Single Row) | £5.00 |
| 1,000 90 × 36mm (Twin Row) | £4.90 |
| 1,000 90 × 49mm (Twin Row) | £7.50 |
| 1,000 102 × 36mm (Twin Row) | £6.25 |

Carriage on 1,000 Labels £1.00

## Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

**Only: £16** (carr. £3)

## Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system w th adjustable deflector plates it ensures smooth paper flow and automatic refolding.

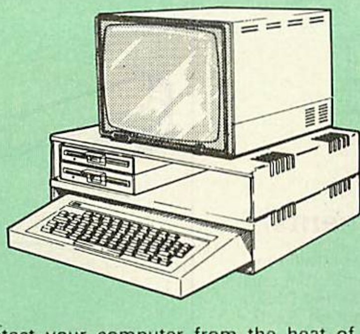
***80 Column version £23** (carr. £3)*
***132 Column version £26** (carr. £3)*

## PRINTER RIBBONS & VARIOUS DUST COVERS

| Type | Ribbons | Dust Covers |
|---|---|---|
| **Brother HR15/20** | £3.00 | – |
| **BBC Micro** | – | £3.50 |
| **BBC Master** | – | £4.00 |
| **Archimedes Micro pair** | – | £9.00 |
| **IBM PCs pair** | – | £6.00 |
| **RX/FX80/MX80** | £3.00 | |
| **DMP2000** | £3.75 | £4.75 |
| **EX/LQ800** | £4.50 | £4.50 |
| **EX/LQ1000** | £7.50 | £5.00 |
| **RX/FX80/85/800/MX80** | £3.90 | – |
| **RX/FX100/1000** | £5.75 | – |
| **Kaga/Taxan KP810/815** | £4.90 | £4.00 |
| **LC10 (Black)** | £4.25 | £5.00 |
| **LQ500/800** | £3.75 | £5.00 |
| **LQ1050/LQ2500** | £8.50 | £5.50 |
| **LX80/86/800** | £3.80 | £4.50 |
| **M1009/GLP** | £3.80 | £3.75 |
| **Panasonic KX1080/81** | £4.00 | £4.75 |
| **SQ2500** | £23.00 | £5.50 |
| **Star NL10** | £3.75 | £4.50 |
| **Olivetti Ink Jet Cartridges (set of 4)** | £9 | |

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

## PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing, easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

| | |
|---|---|
| Single BBC Plinth 420 x 310 x 105mm | £12 |
| Double BBC Plinth 420 x 310 x 210mm | £20 |
| Printer Plinth 420 x 310 x 105mm | £12 |
| Single Master Plinth 490 x 310 x 105mm | £13 |
| Double Master Plinth 490 x 310 x 210mm | £24 |

(Carr. Single plinth 12; double plinth £3)

## Universal Printer Sharers/Changers

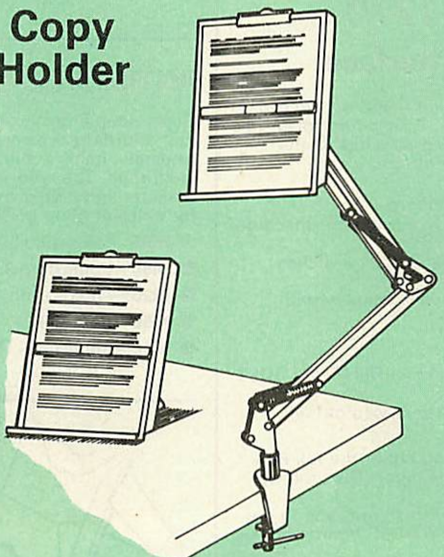
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

**(Ideal for School environments.)**

| Connects | Serial | Centronics |
|---|---|---|
| 2 to 1 | £20 | £22 |
| 3 to 1 | £27 | £30 |
| 5 to 1 | £36 | £39 |

(Cables extra at £6 each. Please specify type required when ordering)

## Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

## MEGABUFFER 256



The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm**.

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

**Only £149** (carr £5)

NEW

## Handy 2 Way Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

| | |
|---|---|
| Compact AB Switch Centronics | **£20** |
| Compact AB Switch RS232 | **£19** |

(Cables extra at £6 each)

## THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

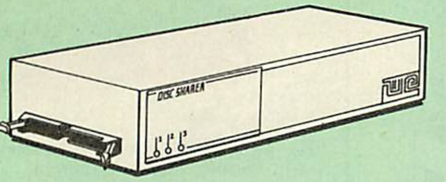
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

**£5.95** (No VAT)

**CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383**

Continued →

# DISC DRIVE SHARER




### (Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

### NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

### WATFORD's & ACORN's DFSs

*Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.* ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DFS Manual (Comprehensive)* (no VAT) **£6.95**
- *DNFS ROM only* **£17** ● *ADFS ROM only* **£25**

*(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).*

(The Single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

NEW

# Watford's MkII 1770

### Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

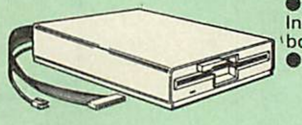
- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

### DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

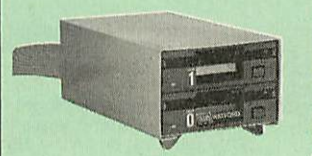
## Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

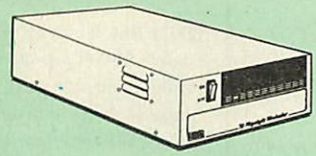
A Bargain at Only **£123** (£7 carr)
(Offer valid while stocks last)

## 3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**



## WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350**; ● 30 Megabyte **£405**
(Securicor Carriage £9)

### FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

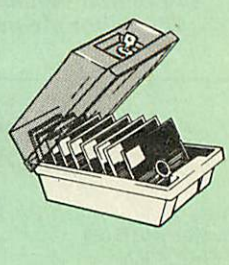
**£4**

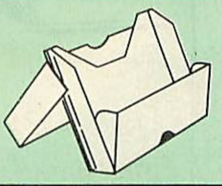
### ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£4.95**
- **M85** – holds upto 95 5¼" discs **£6.95**
- **M25*** – holds upto 25 3 ½" Discs **£4.95**
- **M50** – holds 50 3½" Discs **£6.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable





### PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

### DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.



Protection at Only: **£2**

## Quality Disc Drives from Watford

*To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.*

*The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".*

*The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.*

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

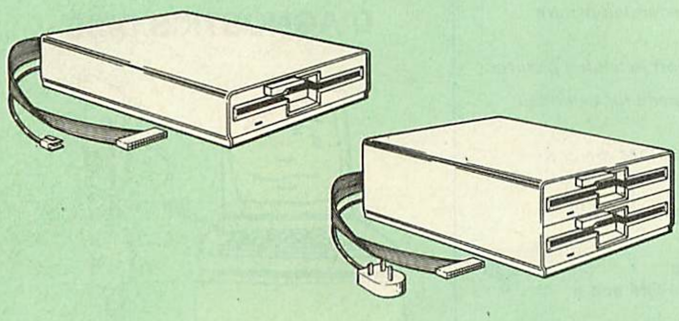
*Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.*

*If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.*

*Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £10. (At Watford we anticipate your needs of tomorrow, not just today)!*

*When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 4th page of our advert for the Plinths).*
*P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.*

**Our Disc Drives conform to BS415**



**"Test Bureau Approved for Use in Education"**

| Capacity | Drives without P.S.U. | | Drives with P.S.U. | |
|---|---|---|---|---|
| | Single | Twin | Single | Twin |
| 400K (720K) | CLS400S £79 | CLD 400 £168 | CS 400S £89 | CD400 £188 |
| 800K (1.44M) | | CLD 800S £159 | | CD 800S £169 |

- TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
**Securicor carriage on Disc Drives £5 to £6**

*Prefix **C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

*Suffix **S** = 40-80 Switchable*

*e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.*

**Cable to connect 5¼" Disc Drives to BBC Compact**
**Single £9 Twin £12**
**Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13**

## Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

**£5.95** (Book No VAT)

# 3M – DISKETTES

*3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.*

- *10 × 5.25" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5.25" D/S D/D 40 Track Diskettes (745)* ***£7.00***
- *10 × 5.25" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5.25" D/S D/D 80 Track Diskettes (747)* ***£11.00***
- *10 × 5.25" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£16***
- *10 × 3.5" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3.5" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3.5" High Density Diskettes* ***£25***

**Special Offer**
Free Designer watch with 5 packs of 3M discs purchased from Watford Electronics.

## TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3.5" D/S D/D 80 Track Discs* ***£10***
- *10 × **M9** 3.5" Double Side High Density* ***£25***
- *10 × **M4** 5.25" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5.25" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5.25" D/S D/D 80 Track Discs* ***£9***
- *10 × **M8** 5.25" D/S H/D Hi-Density Discs* ***£14***
- *3" Double Sided Discs* ***£2.50 each***

## Special BULK OFFER on 5¼" DISCS




(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

**BULK PACK DISCS in lots of 100**

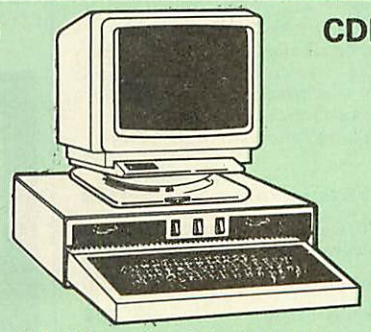
| Type | S-S 40T | D-S 40T | D-S 80T |
|---|---|---|---|
| Without Sleeves | £35 | £39 | £45 |
| With Sleeves | £38 | £42 | £48 |

## DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

**£4**

**DP35-800S** **CDPM800S**

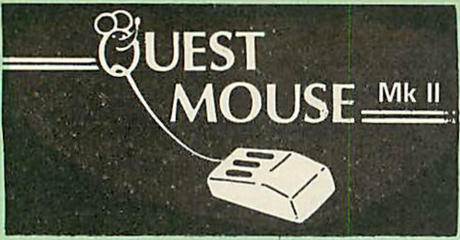


Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

**CDPM 800S for the BBC & Master £182**
**DP35-800 for BBC/Master £169**
(For DP35-800S spec. see Page 2 of our advert)
*(Securicor Carr. £7)*

(The above drive units are 2 Megabytes unformatted)

**Continued**




*The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.*

*The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.*

## QUEST PAINT

*The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.*
*The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.*

### SOFTWARE FEATURES

*The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.*
*Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.*

- Quest Mouse II & Quest Paint — £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont — £89
- Quest Mouse II only — £26
- Quest Paint Software only — £34
- Quest Font Disc — £15
- Quest Mouse Mat (Red or Blue or Green please specify) — £3
- Part Exchange your unreliable AMX Mouse for a Quest Mouse for only — £22
- GXR ROM for the BBC Micro — £22

(P.S. Quest Paint is not compatible with BBC Compact)

**Continued**

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

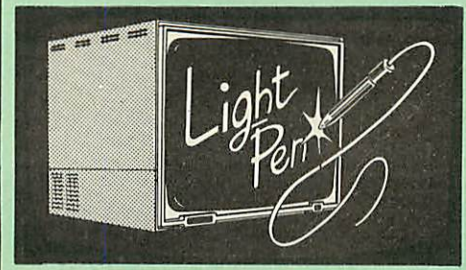
## ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

**ConQuest ROM Package** — **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

## MARK II LIGHT PEN




*Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.*

***Price Only £21***

## RB2 Marconi TRACKER BALL

| | |
|---|---|
| RB2 (AMX/Quest compatible) | £45 |
| RB2 including Quest Paint | £75 |

## FLEET STREET EDITOR

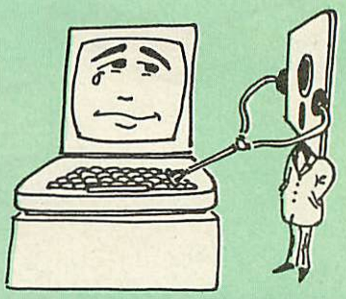
| | |
|---|---|
| Software pack for BBC Micro | £33 |
| Software pack for the Master | £39 |
| Software Pack for Compact | £40 |
| Admin Xtra Disc Utility | £13 |
| Walt Disney Disc Utility | £13 |
| Fonts N Graphics Disc Utility | £13 |

## *THE NEW Mk III AMX MOUSE*

**ONLY: £59 Inc. Super Art package**
(carr £3)
*(Please specify for BBC, Master or Compact)*

| | |
|---|---|
| MOUSE MAT | £3 |
| AMX MOUSE ONLY | £29 |
| AMX UTILITY Package | £13 |
| AMX SUPERART Package | £34 |
| AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse | £32 |
| **PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker** | £13 |
| AMX DESIGN (ROM) | £55 |
| AMX XAM Educational | £15 |
| AMX EXTRA EXTRA | £16 |
| AMX MAX A gem of desktop (ROM) | £15 |

## DIAGNOSTICS DISC

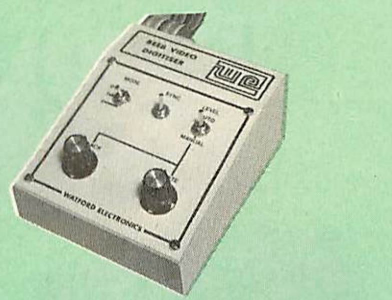


The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

**Only £20.00**

VISA
CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

## *BEEB* VIDEO DIGITISER



**"Test Bureau Approved for Use in Education"**

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

**£109** (Carr. £5)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

## *Magazine Maker*

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)




Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K Rom contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertip. The software has a word processor, a graphics package, a page layout section and a font designer. Although very sophisticated, Wapping Editor is simplicity itself to use. Anyone already familiar with Quest Paint will immediately feel at home.

## GRAPHICS PACKAGE

Imagine Quest Paint re-written to take advantage of the high resolution of Mode 0, well this is it. The Wapping Editor could well be worth buying for this facility alone. This must surely be the graphics.

## WORD PROCESSOR

This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. The features of this word processor include wordwrap, wordcount, insert/overwrite, move block, copy block, delete block, search and replace, browse, etc, many of these features being mouse controlled. Text input can of course be taken from existing word processor files like Wordwise, View, etc, but it is not necessary to have a separate word processor in order to use this package.

## PAGE-LAYOUT SECTION

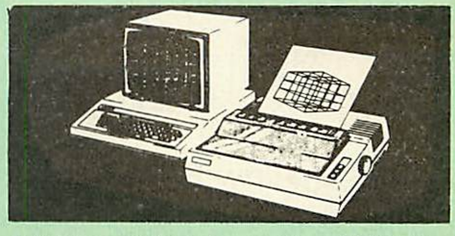
Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squahsed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

## THE FONT EDITOR

This is an enhanced version of the font editor contained in the Con-Quest ROM and allows the editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Pain may be loaded into the editor and converted for use with the Wapping Editor. This sophisticated editor has numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed. This font editor will also allow 'font' and 'brush' files to be designed for use with Quest Paint.
This package is the latest in the line of integrated professional quality mouse-driven software from Watford Electronics, the company that adds power to Beeb.

Wapping Editor — Launch Offer: **£69**
Wapping Editor with Quest Mouse — **£89**

## DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yer produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

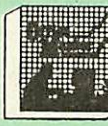
Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

**Only: £25**

## *OFFICE MASTER*



**CASHBOOK** – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

**FINAL ACCOUNTS** – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

**MAILIST** – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

**EASILEDGER** – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

**INVOICES & STATEMENTS** – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

**STOCK CONTROL** – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

## *OFFICE MATE*



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

**DATABASE** – Set up a computerised card index system with powerful search facilities.

**SPREADSHEET** – Offers many calculation and editing features.

**BEEBPLOT** – Provides visual representation from Spreadsheet data.

**OFFICE MATE Only £10** (Disc)

**Continued** →

# ARIES CORNER

## B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

## Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

| | | |
|---|---|---|
| Price: | Aries B-12 | **£40** |
| | Aries B-12C | **£5** |

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

## ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

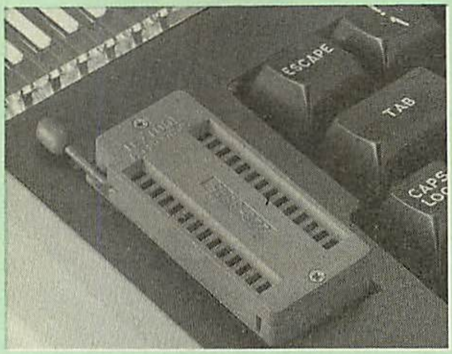
**£238** (Carr £3)

## EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

## SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

## Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

| | |
|---|---|
| ● Complete System | **£11** |
| ● Spare Cartridges | **£2.50** |
| ● Spare Rack | **£1.50** |

**ROM Cartridges for the BBC Master**
Twin **£8**; Quad **£12**

## 16K DISC RAM

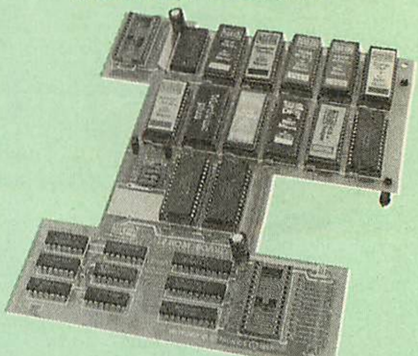
Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Compact construction.
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£35** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

## SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

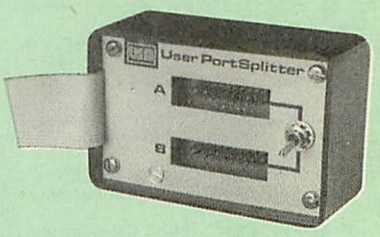
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

**Price: Only £35**
Battery backup fitted **£39**
Battery Backup only **£3**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

**Only: £8**

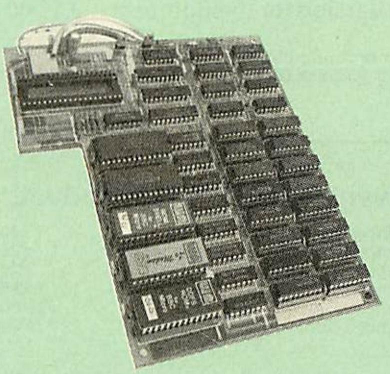
## USER PORT SPLITTER UNIT




Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

## ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later:

Please write in for further details.

***INTRODUCTORY PRICES:***

- ROM/RAM card with 32k dynamic RAM ...... ***£48***
- ROM/RAM card with 64k dynamic RAM ...... ***£65***
- ROM/RAM card with a massive 128k dynamic RAM ........ **£109**

(carriage on ROM-RAM Card £3)

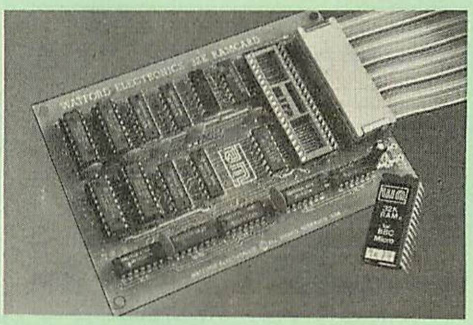
***OPTIONAL EXTRAS:***

- 16k plug-in Static RAM kit........ **£17**
- 16k Dynamic RAM for Upgrade........ **£17.50**
- Battery backup........ **£3**
- Read and Write protect switches........ **£2 each**

Complete ROM-RAM board
All options installed ........ **£115**

**P.S.**
**Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less**

## 32K SHADOW RAM-Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

**Only £59** (carr £2)
(Price includes a comprehensive manual and the ROM)

### INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

## THE COMPLETE BBC COMPUTER USER HANDBOOK

*"Why has no-one written a book like this before? It's long overdue".*
If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

**GENERAL** – Uses and abuses of computers.

**HARDWARE** – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

**HARDWARE RUNNING BBC-BASIC** – All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

**GETTING ORGANISED** – so that you keep track of your programs and control of your software. Setting up for easier programming sessions.

**NEAT PROGRAMMING** – Good style. Writing structured programs. Getting the best from BBC-BASIC, Graphics and screen displays. Speeding up programs. Saving space.

**GENERAL PROGRAMMING TIPS AND HINTS** – with a multitude of examples (eg input vetting, dealing with dates, blanking out function key messages, error trapping, disabling ESCAPE and BREAK, use of EOR with colour, etc).

**DEBUGGING** – Specific errors and how to handle them. How to test programs fully.

**STANDARD PROGRAMS** – Assessing word-processors, spread-sheets, databases, graphics packages, communications etc. How to customise them to your own requirements.

**COMPUTERS AT HOME AND IN THE OFFICE** – Introducing the computer to the office. Program protection. Computers and the law. Communications. Selling your own programs. 28 FULL CHAPTERS, elegantly written and extensively indexed. To dip into, consult, or read from cover to cover, again... and again... and again...

**£14.95** (Book No VAT)

## APOLLO

### The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

Sale Offer: **£64** **(Carr £5)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

Continued →

### COMPUTER CONCEPT'S ROMS

| | |
|---|---|
| ACCELERATOR | £30 |
| CARETAKER Basic Utility | £23 |
| DISC DOCTOR | £28 |
| Graphics ROM | £29 |
| TERMI | £25 |
| COMMUNICATOR | £49 |
| Printmaster | £24 |

**Wordwise** £26

**Wordwise plus** £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

### Word-Aid

**The most comprehensive utilities ROM for Wordwise-Plus**

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

**HI-WORDWISE-PLUS DISC:** £5

**SPELL MASTER** £42

**Inter SHEET** ONLY £37

**INTER CHART** ONLY: £25

**Inter-WORD** £36

### MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

**INTERBASE £49**

All Prices Exclusive of VAT

## VIEW

| | |
|---|---|
| VIEW WORDPROCESSOR 2.1 | £35 |
| **VIEW 3.0 ROM** | **£48** |
| **VIEW PROFESSIONAL** | **£59** |
| **HI-VIEW** (for 6502 2nd Processor) | £36 |
| **VIEWSHEET (Acornsoft)** | £36 |
| **VIEWSTORE** | £36 |
| **VIEWSPELL with 80 track disc** | £29 |
| **VIEWPLOT Disc** (Please specify for Master 128 or Compact) | £20 |
| **VIEW-INDEX** | £12 |
| **OVERVIEW Packs 1 & 2** | £69 |

### Watford's own Sophisticated VIEW PRINTER DRIVERS

| | |
|---|---|
| Epson FX80 & Kaga KP (Disc) | £8 |
| Juki & Brother HR15 (Disc) | £8 |
| Silver Reed Printers (Disc) | £8 |

### BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs £11.25
- Maths with a Story 2 (Disc) 4 further maths programs £11.25
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs £17
- WAVES: Science Topics (Disc) CSC O Level Physics program. £14.95
- RELATIONSHIP: Science (Disc) O Level Biology program. £20.00
- BONDING: Science (Disc) O Level Chemistry program. £20.00
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. £20.00
- ELECTRONICS IN ACTION (Disc) O Level program £19.95
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. £20
- ECOLOGY (Disc) O Level program. £20
- POLYMERS (Disc) O Level program. £20
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. £20
- FOOD & POPULATION (Disc) O Level program. £20
- MICROTECHNOLOGY (Cassette) O Level program. £11.25
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. £21.70
- DEUTSCH DIREKT! (Disc & Audio Cassette) £19.95
- Modem Master (Disc) £11.25
- ADVANCED TELETEXT SYSTEM £8.65
- PERIOD TABLE SOFTWARE £20
- Astronomy – Primary (Disc) £12
- Computers at Work – Primary £17.35
- Introducing Geography – Primary £17
- **Introducing Geography 11-17yrs** £17.50
- Electric Fields 6-14 years £11.25
- BlackQueen Contract Bridge £13
- Espana Viva – 3 Discs £19.95
- A Vous La France Disc £21.50

### MINI OFFICE II

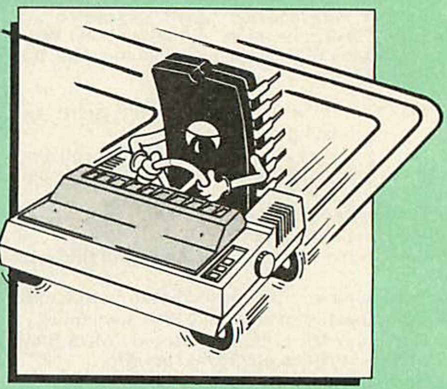
| | |
|---|---|
| DISC Version for BBC B & B+ | £14.00 |
| DISC Version for BBC Master | £16.50 |
| Disc Version for the Compact | £18.00 |

(When ordering please specify for which Micro & 40 or 80 track Disc).

### Advanced Computer Products

| | |
|---|---|
| Advanced Disc Toolkit | £30 |
| Advanced Disc Investigator | £25 |
| Advanced 1770 DFS BBC | £29 |
| Advanced 1770 DFS Master | £30 |
| Advanced File Manager | £25.00 |
| Advanced Control Panel | £30.00 |

### VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

**Price: Only £33**

## BOOKS (No VAT on Books)

| | |
|---|---|
| 15 Hr Wordprocessing BBC/View | £5.95 |
| 15 Hr Wordprocessing BBC/WW & WW+ | £5.95 |
| 30 Hour BASIC (BBC Micro) | £12.95 |
| 6502 Assembly Language Programming | £19.95 |
| 6502 Application | £13.95 |
| 6502 Development Package | £7.50 |
| 6502 Programming the | £16.95 |
| 6502 Reference Guide | £10.95 |
| 68000 Assembly Language | £15.95 |
| 68000 Assembly Language Prog. | £10.95 |
| 68000 Assembly Language Techniques | £24.95 |
| 68000 Machine Code Programming | £13.00 |
| 68000 Microprocessor Handbook | £14.95 |
| 68000 Programming the | £22.95 |
| 68000 User Guide | £8.95 |
| 6809, Programming the | £18.95 |
| Advanced Disc User Guide | £18.95 |
| Advanced Prog. Guide to BBC | £9.95 |
| Adv. Sideways RAM User Guide | £9.95 |
| **Advanced User Guide for BBC** | £10.95 |
| Amiga Hardware Ref Manual | £23.70 |
| Amiga Machine Lang. Guide | £19.95 |
| ARM Assembly Lang. Prog. Manual | £14.95 |
| Art of Microcomputer Graphics | £16.95 |
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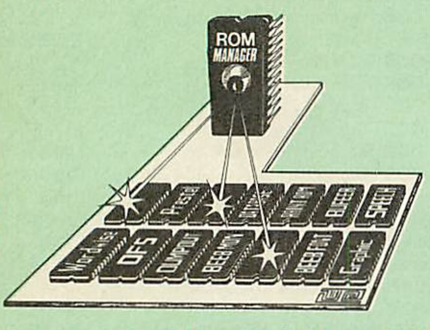
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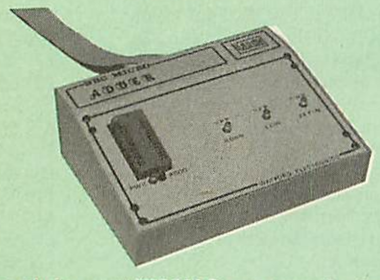
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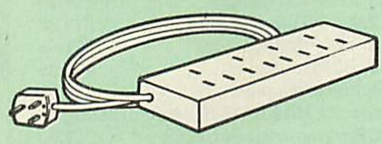
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| Acorn COMAL | £38 |
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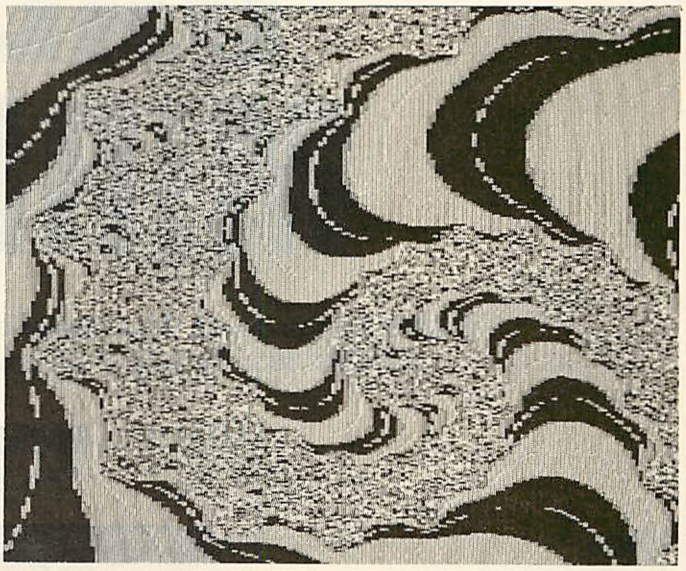
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# BALL OF MIRRORS

**Tracing light to create three dimensional images is a complex, but worthwhile, exercise. With the help of our program, perhaps you too can have a go**

***Richard Browning***

Ray tracing is a technique for painting pictures by working out how light travels. It is strongly associated with the raw computing power and graphics ability of 16- or 32-bit computers like the Amiga – and the Archimedes, of course. But that doesn't stop you trying it out, even if you only have a model B or an Electron.

Of course 'render bending' is faster, and can be very colourful on the more powerful micros. Several Amiga and Arc demonstrations rely on screens generated using ray tracing – spinning glass prisms, jugglers, Newton's cradles and the like.

The most important aspect of ray tracing is the ability to represent three-dimensional scenes in the most realistic manner possible. But the scenes used to show ray tracing off are usually quite artificial – worlds of chessboards, tartan and ball bearings.

There are a few different ways in which to display ray-traced objects; one is termed 'octree' representation, and the other is vector-based – literally tracing light through the scene. The former has the advantage that a scene can be described through a database of 'voxels' (3D pixels) representing a space and the objects in it – and depending on database size, it is quite quick. Some of the voxels in the database are transparent 'air', some are solid – parts of objects – and some have surface properties like reflectivity, colour and so on. The way it works is that the light ray is 'traced' into the database (or array) of voxels. As the ray passes through one voxel what happens to it is determined by the database. It may continue unhindered, be refracted (bent), reflected or even combinations of these processes may take effect.

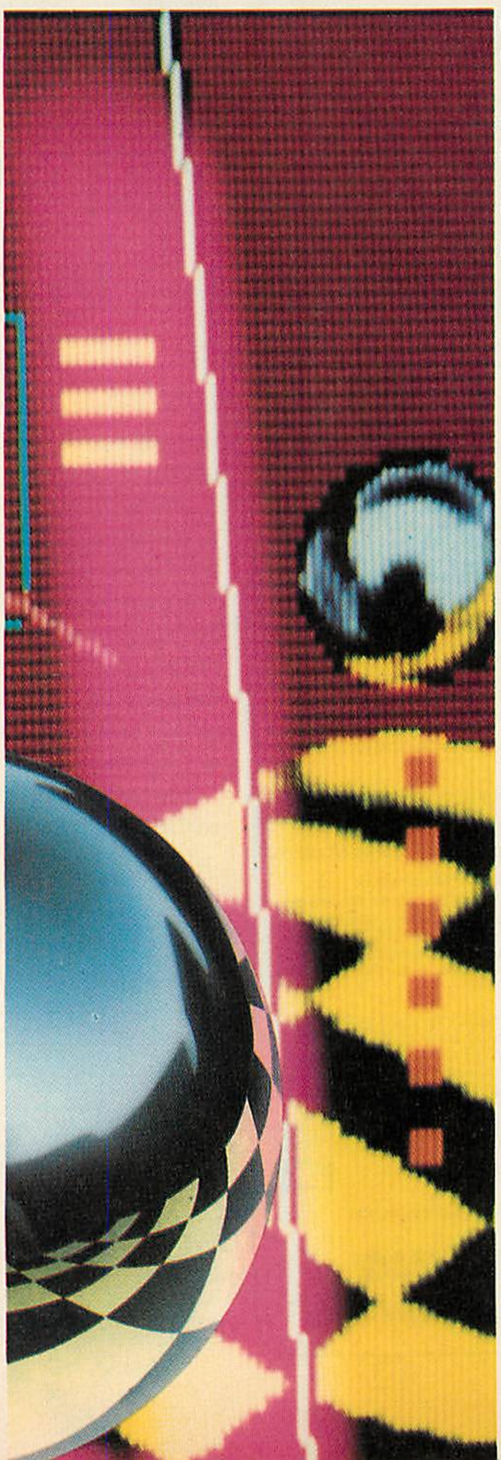


ILLUSTRATION BY PAUL ALLEN

The disadvantage is that for accurate representation, a huge database of many megabytes is required. At the same resolution as a mode 1 screen, a simple 'screenful' of voxels would take 6.5 megabytes.

As the memories on our favourite computers are rather modest by comparison, our model will be dealing with light tracing only!

## Techniques in ray tracing

Imagine an object like a metal ball, suspended in space, with a single spotlight directed at it. How do you ray-trace it? The first thing to recognise is that it would be impractical to follow the paths of each of the rays emanating from the light – it would take forever.

The solution is to realise that the only area of the scene you are interested in is that bit visible through the 'window' of the monitor. So, only those light rays passing through the window and striking the eye are of interest. Then, to begin, you trace rays back from the eye, through each pixel on the window, into the scene, to see where they came from. Once you know where it came from, the pixel on the screen can be coloured accordingly.

Now, do you trace each ray in small steps (as if you are tracing a small particle along the path of the ray), testing at each step until the ray (particle) hits something? Or do you represent the ray and all the objects like the metal ball in terms of a vector equation? It all depends. Simplicity dictates the former, but speed the latter. In this model rays

are described as vector equations. Don't worry – you don't need to understand the maths to run the programs.

Next, what happens when the ray actually does hit a surface? The object that it hits has definite surface properties. It may be a matt object, like a squash ball, it may be a reflecting object, like a metal ball, or it may be like a goldfish bowl. It could even be a shiny object, like an apple.

The model described here is able to represent all these properties, with the exception of transparency.

Take the case of the ray striking the matt object – diffuse reflection. Being matt, the intensity of light at the point which the ray hits the object depends on the angle which light from the lamp hits it. If it is head on, then it looks bright; if it just grazes it, then the object looks dimmer – the light is more spread out over the angled surface.

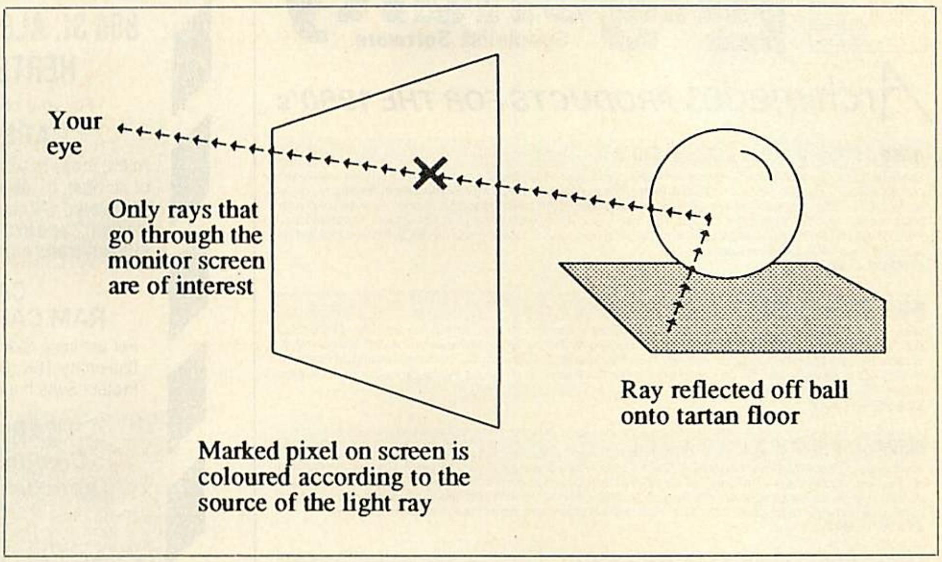
So to work out how bright a point on a surface is, you work out the angle between the ray from the lamp and the 'normal' to the surface. This normal is the line at right angles to the surface, the line sticking directly out of the surface at the point. It's the opposite of a tangent, really, as the tangent lies directly along the surface.

It's dead easy to find the normal vector at a point on a sphere – all we do is extend the radius of the sphere through the point in question. You only need to do one more thing to the normal: make its length that of one unit (called the unit vector). That's simple – use Pythagoras' theorem. Just extend it into three dimensions.

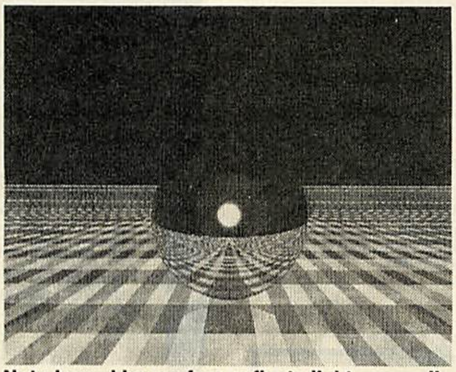
You now have your unit normal, and using Pythagoras again, you can calculate the unit vector from the light source.

To find the angle between the two lines you have computed, and the brightness of that point of the object, you use a formula derived from 'Lambert's Law'. The brightness at a point depends on the cosine of the angle between the normal vector and the ray from the lamp. There is a convenient method to calculate this, known as the dot product, which is used in the listing.

Although this stage may seem elementary – *Zarch* uses this method to calculate the brightness of surfaces – you are cutting corners. Even a matt object, like the squash ball, can show a 'glow' from the surroundings. As well as the lamp, it's lit by the diffuse reflection from the rest of the scene. But there's an infinite number of rays hitting the object from the rest of the scene – so it would be totally impractical to even try representing the 'glow' by tracing all the rays. The only, simple, way in which it may be done is to treat each light-reflecting surface as a light source for that point, and approximate the intensity using Lambert's Law, measuring the angle between the normal and the point on the ball and the normal of the reflecting surface. The intensities of all the lamps and reflecting surfaces could then be added together to provide the final result – the brightness of the point.




**To see where rays come from, trace them from the eye, through to pixels and into the scene**



**Note how shiny surface reflects light unequally**

## Reflection

It may seem simple at first – after all, mirrors reflect without any trouble. At this point however, there's a restriction on our program: the eye position will be at (1, 0, 0). This means you can use a far simpler formula to calculate the direction reflected (Xr, Yr, Zr) from a surface with normal (Xn, Yn, Zn):

$$Xr = 2 * Xn * Xn$$
$$Yr = 2 * Yn * Yn$$
$$Zr = 2 * Zn * Zn - 1$$

For our single metal ball, we have only to find which part of the environment (such as the tartan surface or the lamp) the reflected ray hits. Whatever the intensity is at that point, so the intensity of the point on the object will become. Note that with more reflective objects, the ray may rebound from several others until it leaves the scene or strikes a surface which does not reflect.

Although the model doesn't include transparency, I'll describe a formula which does. The main item to note is that whenever light travels from one medium into another, the ray is refracted (bent). The angle at which the ray is refracted involves what is known as the index of refraction. This formula is a straightforward bit of physics that you could look up in a text book.

You must remember that unless the surface is perfectly transparent, there will also be an element of reflection – and this now means the tracing of two rays. With more objects in the scene, this could multiply enormously, so you see now why complex scenes take ages to work out. This is an application in which recursion comes into its own; a tree structure is formed as the ray keeps 'branching'.

The last topic to cover is specular reflection – concerned with shiny surfaces. Shine a bright light on an apple, and you will see highlights on its surface. Those highlights are caused by specular reflection; the rest of the light reflected is generated by diffused reflection. Unlike perfectly reflective surfaces, shiny surfaces reflect light unequally in different directions and the highlight appears where the 'bright direction' points towards your eye. A chap called Bui-Tuong Phong

developed a formula for representing such surfaces. Not perfect, it is however the basis for another formula which also involves diffuse reflection. This is the one our model uses, and is described in greater detail in one of the references given at the end of the article.

If there was any single process which occupied time in ray tracing it would be computing where light rays hit objects.

The basic question is, given the ray with vector equation (or direction) $\bar{p} = ai + bj + ck$, what is the point of intersection with the plane $Ax + By + Cz + D = 0$? or, what is the point of intersection with the sphere $x^2 + y^2 + z^2 = r^2$?

The former, plane, equation is dealt with in many maths books and graphics texts – so we will stick to the latter, sphere, equation. You end up with a 'quadratic' equation to solve. If it turns out that the roots are complex numbers ($b^2 - 4 * a * c < 0$) then the ray does not intersect the sphere. But, if it does, then the equation returns both points of ray-sphere intersection. You obviously want only the point nearest the eye. Don't forget, though, for multiple objects there will be multiple intersections. Hence, a technique called 'z-buffering' may be needed in such a case. This sorts the objects in order of furthest-nearest because a single ray may intersect more than one object. Alternatively, the ray can be traced in steps (rather than make fancy footwork like z-buffering) but it does take longer.

The final attachment the model requires is shading. This is simple: if the ray hits the surface, you check if there is any object between the surface and the light source. If there is, that point on the surface is in shadow. You can make this more involved by dealing with transparent objects, creating a lighter shadow.

### The program

The program on the yellow pages describes a scene with a single sphere and cup. The ground is a tartan design. The sphere can have any amount of scene reflection, specular reflection or diffuse reflection, and it also casts a shadow.

For the specular formula to work, the light source must be at the eye position – which gives a view a bit like wearing a miner's helmet. If it weren't, the reflection formula used would have to be the longer one – and the program would be much more complex.

## THE RAY TRACING LISTING

```
10 REM Ray-tracing environment
20 REM by Richard J. Browning
30 REM for B/B+/M/C/A
40 REM (c) BAU May 1989
50 :
60 PROCinitialise
70 :
80 MODE 2
90 VDU 29,640;512;
100 FOR S%=1 TO 7:READ C%:VDU 19,S%,C%;0;:NEXT
110 FOR x%=-640 TO 640 STEP 8
120 FOR y%=-512 TO 512 STEP 4
130 x_rat=(ex%-x%)/(ez%-wzp%)
140 vec1=(ez%*x%-ex%*wzp%)/(ez%-wzp%)
150 y_rat=(ey%-y%)/(ez%-wzp%)
160 vec2=(ez%*y%-ey%*wzp%)/(ez%-wzp%)
170 a=(x_rat*x_rat)+(y_rat*y_rat)+1
180 b=2*(x_rat*(vec1-bx%)+y_rat*(vec2-by%)-bz%)
190 c=((vec1-bx%)*(vec1-bx%))+((vec2-by%)*(vec2-by%))+(bz%*bz%)-(radius%*radius%)
200 root=(b*b)-4*a*c
210 IF root>=0 THEN PROCsphere
220 IF root>=0 AND y>sy% THEN PROCreflect ELSE PROCsurface
230 NEXT
240 NEXT
250 END
260 :
270 DEF PROCunitvec(XE,YE,ZE)
280 UL=SQR(XE*XE+YE*YE+ZE*ZE)
290 XU=XE/UL
300 YU=YE/UL
310 ZU=ZE/UL
320 ENDPROC
330 :
340 DEF FNdotprod(X1,Y1,Z1,X3,Y3,Z3)
350 =X1*X3+Y1*Y3+Z1*Z3
360 :
370 DEF PROCsphere
380 z0=(-b+SQR(root))/(2*a):z1=(-b-SQR(root))/(2*a)
390 IF z0>z1 THEN z=z0 ELSE z=z1
400 x=x_rat*z+vec1
410 y=y_rat*z+vec2
420 ENDPROC
430 :
440 DEF PROCreflect
450 PROCunitvec(x-bx%,y-by%,z-bz%)
460 XN=XU:YN=YU:ZN=ZU
470 XR=2*XN*ZN:YR=2*YN*ZN:ZR=2*ZN*ZN-1
480 IF YR<0 THEN YD=YR:XD=XR:ZD=ZR:ST=-(y-sy%)/YD:X=XD*ST:Z=ZD*ST:i=10+3*((ABSZ MOD160)<80)+3*((ABSX MOD160)<80) ELSE i=0
490 PROCunitvec(lx%-x,ly%-y,lz%-z)
500 LDN=FNdotprod(XN,YN,ZN,XU,YU,ZU)
510 PROCunitvec(ex%-x,ey%-y,ez%-z)
520 XV=XU:YV=YU:ZV=ZU
530 PROCunitvec(XR,YR,ZR)
540 RDV=FNdotprod(XU,YU,ZU,XV,YV,ZV)
550 xr=lx%-x:yr=ly%-y:zr=lz%-z
560 r=SQR(xr*xr+yr*yr+zr*zr)
570 i2=(6000/(r+20))*(0.1*LDN+2*(RDV^60))
580 IF i2<0 THEN i2=0
590 i=i+i2:IF i>15 THEN i=15
600 IF i>0 THEN col%=i ELSE col%=0
610 GCOL 0,col%/2
620 PLOT 69,x%,y%
630 ENDPROC
640 :
650 DEF PROCsurface
660 z_diff%=ey%-y%
670 IF z_diff%=0 THEN ENDPROC
680 x_diff%=ez%-wzp%
690 IF x_diff%=0 THEN ENDPROC
700 sz=(wzp%*(ey%-sy%)+ez%*(sy%-y%))/z_diff%
710 IF sz>=0 THEN ENDPROC
720 sx=(x%*(ez%-sz)+ex%*(sz-y%))/x_diff%
730 x_rat=(lx%-sx)/(lz%-sz)
740 vec1=(lz%*sx-lx%*sz)/(lz%-sz)
750 y_rat=(ly%-sy%)/(lz%-sz)
760 vec2=(lz%*sy%-ly%*sz)/(lz%-sz)
770 a=(x_rat*x_rat)+(y_rat*y_rat)+1
780 b=2*(x_rat*(vec1-bx%)+y_rat*(vec2-by%)-bz%)
790 c=((vec1-bx%)*(vec1-bx%))+((vec2-by%)*(vec2-by%))+(bz%*bz%)-(radius%*radius%)
800 root=(b*b)-4*a*c
810 col%=4
820 IF root<0 OR y<sy% THEN lighti=sx-lx%:lightj=sy%-ly%:lightk=sz-lz%:PROCunitvec(lighti,lightj,lightk):i=-lightj/UL:IF i>=0 THEN col%=4+i*4
830 zpos%=sz
840 xpos%=sx
850 col%=col%+6+3*((ABSzpos% MOD160)<80)+3*((ABSxpos% MOD160)<80)
860 GCOL 0,col%/2
870 PLOT 69,x%,y%
880 ENDPROC
890 :
900 DEF PROCinitialise
910 ex%=1:ey%=0:ez%=0:lx%=1:ly%=0:lz%=0
920 bx%=0:by%=-100:bz%=-500:radius%=300
930 sy%=-450:wzp%=-300:y=0
940 ENDPROC
950 :
960 DATA 4,1,5,2,6,3,7
```

Of course, each of the sphere attributes may be altered (you could set it for reflection, just specular and diffuse) and the sphere itself may be moved.

You may like to try removing some of the above restrictions – or produce your own animated sequences on the Archimedes. With ray tracing, you can create the world!

As it has been described the program will work on any Acorn machine, including the Electron in mode 2. However, you will find it necessary to use a mono monitor (or turn the colour right down). It's shades of grey only, I'm afraid. To introduce colour you will need three separate equations for each RGB value.

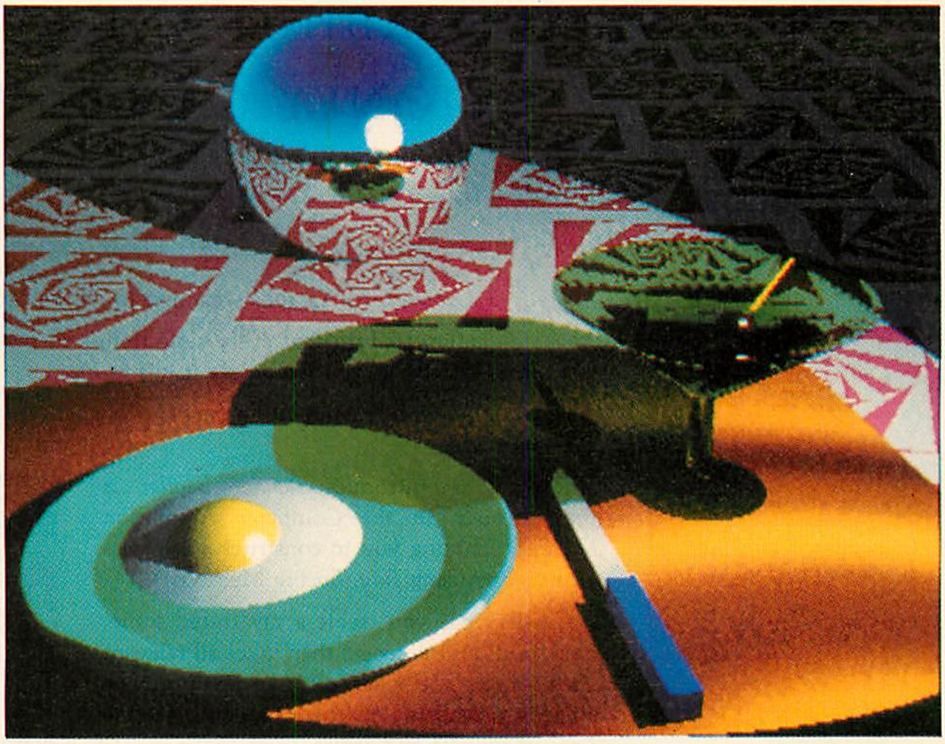
Archimedes users may like to alter the lines in the box for an improved picture. And you won't be confined to a mono monitor. If you follow up the references, you'll notice that the formula for specular reflection is at line 570. Remember, in order to increase the diffused reflection, you must increase the LDN coefficient. Similarly RDV controls the specular reflection.

### CHANGES FOR ARCHIMEDES

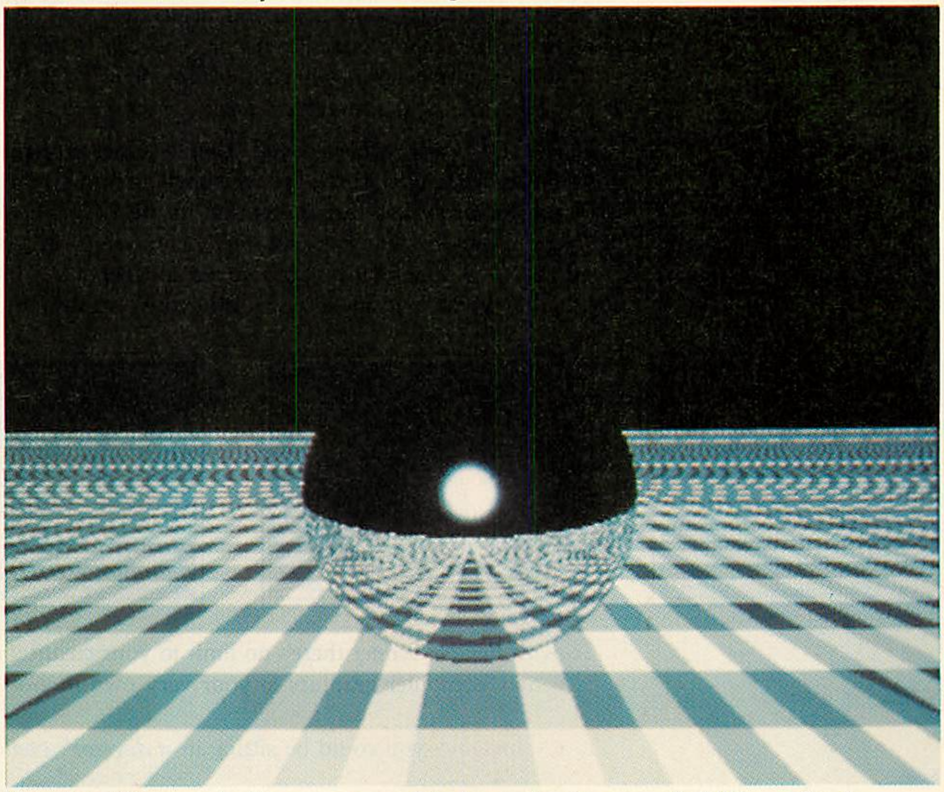
```
 80 MODE 12
 81 FOR I%=0 TO 15
 82 COLOUR I%,I%<<4,I%<<4,I%<<4
 83 NEXT
110 ...STEP 2
610 GCOL 0,col%
860 GCOL 0,col%
```

If you would like to trace any object other than a sphere, DEF PROCsphere in line 370 is where the sphere quadratic is solved.

You can insert your own equations in these places – but you'll also have to alter the shadow computation. There's a version of the program with comments on the monthly disc, which should help you if you want to alter it.



**Clares' Render Bender: Objects between the light source and the surface cause shadows**



**Note the differences in the scene caused by increasing the amount of diffuse reflection**

### REFERENCES


1. *(Teach Yourself) Computer Graphics,* John Lansdown, Hodder & Stoughton 1987. (Very well-written book, many good explanations of simple concepts and techniques)
2. *Fundamentals of Interactive Computer Graphics,* J D Foley & A Van Dam, Addison-Wesley 1984. (Heavy maths, but a bit airy in places)
3. *An Improved Illumination Model for Shade Display,* Turner Whitted, Communications of the ACM June 1980 Vol 23 No 6 (THE Reference!)
4. *Texture and Reflection in Computer-Generated Images,* J F Blinn & M E Newell, Comm. ACM October 1976 Vol 19 No 10. (Very simple, and techniques well-explained)
5. *Transparency, Refraction and Ray Tracing for Computer Synthesised Images,* (Master's thesis), D S Kay, Cornell University Ithaca, New York, January 1979. (Interesting)
6. *Illumination for Computer Generated Images,* Bui-Tuong Phong. ACM Vol 18 No 6 June 1975. (Easy reading – the basis of our (and most other) shading method)


Any decent public library should be able to supply you with the literature above – though you'll probably have to order them. If not, try the library of a Poly or University. Some of the references refer to each other.

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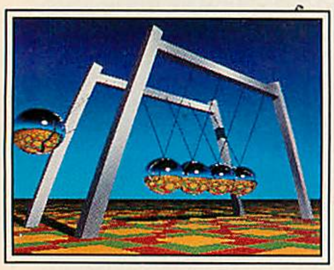
## RENDER BENDER

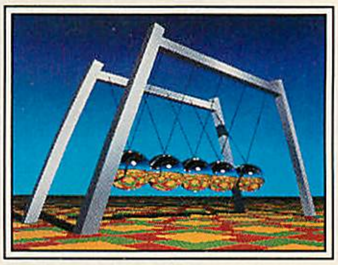
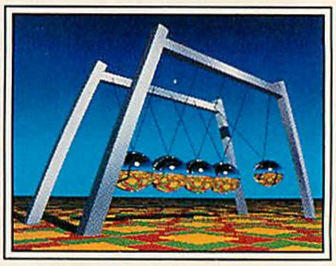
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# QUESTION TIME

**Education and business are two areas where surveys are often necessary. Can your BBC micro help carry them out?**

*Joe Telford*

Homework nowadays is focused on practical activities leading to developing initiative in problem solving contexts. So it was that my daughter had been asked to design and carry out a survey. I, pounced upon early one morning, was virtually the last person on her list, hence the raggy state of her questionnaire sheet.

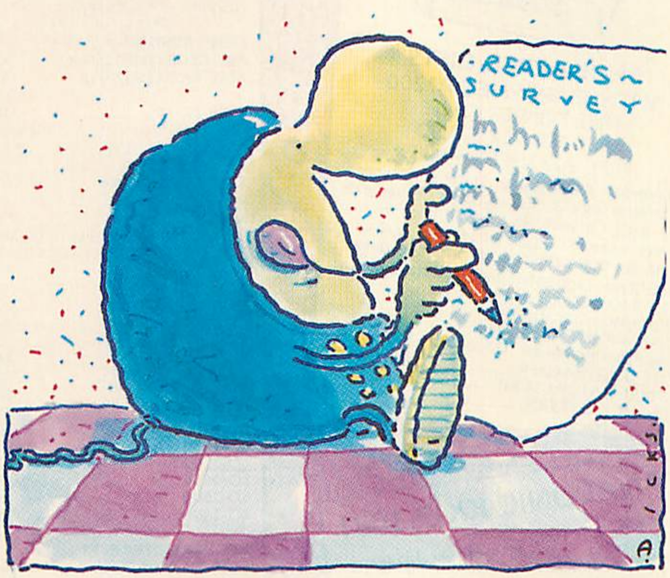



ILLUSTRATION BY IAN DICKS

Having obtained some data, she needed to present and interpret it and deliver a report on the state of the breakfast food market. I was immediately interested as the project was clearly a small element in the new regime of Design Technology.

Surveys generally fall into two categories – those which are open-ended, and those which cover a specific question-set in detail. The open-ended survey is most commonly found in clubs, schools, amateur societies and the like, and is often unfortunately based on a group of people sitting down and asking a range of seemingly pertinent questions. In figure 1 a typical questionnaire which can be quickly thrown together and looks pretty impressive. Unfortunately there are specific problems associated with open-ended questionnaires. People can give a wide range of answers and the sample might then not be significant. The actual aim of the survey might not be definable. Also the finished sheets take a long time to combine and often computer tools are difficult to apply.

The major problem with any survey is that there is a tendency to jump straight into writing down questions. A better technique is to work from the expected answers back to the questions which will give you answers in that area. For example compare the questions: 'Which is your favourite chocolate?' and 'Tick your favourite chocolate in this list'.

The answers to the first question probably depend on factors like age, and sex, so the range of answers could be too wide for a simple survey. The second question forces the interviewee to consider a subset of chocolates, and might provide a better sample of results.

## Computer tools

The other point to make is that there are two computer tools which can help analyse surveys. The first is the database, which is capable of answering questions like 'How many fathers eat smoked bacon on Sundays'. The difficulties involved with databases are large, even apart from learning how to use it in the first place. There is a point at which the database becomes too powerful a tool, and a simpler product or a hybrid – manual/software system – is often more appropriate. The complexity of the survey and the information we need must be the deciding point.

Look again at Figure 1. Note the example of the specific question survey. If you feel that this is a simple way in which to collect specific survey data then you can design a collation sheet which can be used to sum the data manually. The collation sheet is also shown in Figure 1. The output is a number matched to each category in each section of the survey.

The role of the computer in this hybrid is more as a presentation tool. The stages of developing a survey are to specify the theme, the expected outcome(s) of the survey and the like. You should specify sections and categories within the sections.

Design the questionnaire and the collation sheet(s). Your next step is to actually collect and collate data. You can set up a computer model of the collation sheet and present the data in appropriate graphical ways before drawing your final conclusions and presenting the report.

Notice that in all these stages there are only two elements where the computer comes in. If the computer does some of the job more accurately, more efficiently, faster and more neatly than ourselves, then it is being used as an appropriate tool. We really have to get away from the scenario of 'the computer doing everything, despite the cost and complexity'. Let's consider an appropriate computer specification for a survey data presentation program.

First we need to copy the collation sheet of the open ended survey into the computer memory, in a suitable format. A logical way of doing this is by regarding each section of the questionnaire as a 'screen' of memory. The screen can be manipulated in a number of ways.

You can edit and sort data, next you

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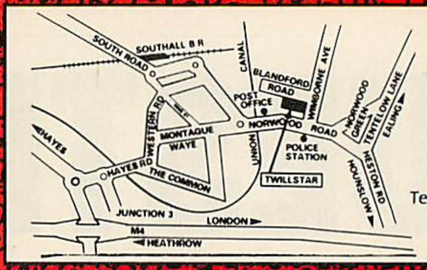
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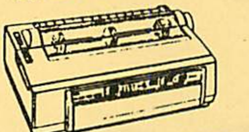
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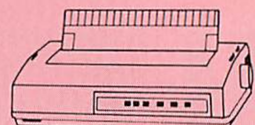
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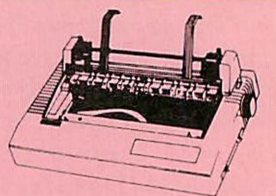
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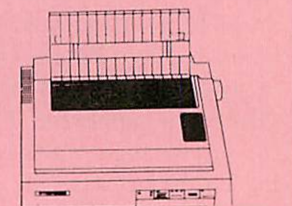
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*What is your favourite fruit sweet?*

..............................................................

*What is your favourite Mint Sweet*

..............................................................

*What is your favourite Chocolate?*

..............................................................

*What is your favourite Toffee?*

..............................................................

*What is your favourite overall?*

..............................................................

*What is your sex?*

..............................................................

*How old are you?*

..............................................................

*What are your favourite fruit sweet?*

Polos............ Refreshers............ Wine gums ............
Tic-tacs............ Opal Fruits............

*What are your favourite Mint Sweet*

Polos.............. Foxes.............. Trebor ..................
XXX.............. Mintos..............

*What is your favourite Chocolate?*

Mars.............. Crunchie............. Bounty ..................
Wispa.............. Ripple.............

*What is your favourite Toffee?*

Rolo.............. Cinder............. Toffos ..................
Eclair.............. Caramel.............

*What is your favourite overall?*

Fruit............... Mint............. Choc .................. Toffee ..............

*What is your sex?* Male................ Female..........

*How old are you?*

under 11.......... 12-17......... 18-21.......... 22-30.........




**Figure 1. From left to right, an open-ended survey, a specific-question survey and a collation sheet to be used with the latter**

can present it graphically in a number of ways, and linked to this there's also the ability to print out the processed information. The final useful tool is obviously that you can save the file for later re-use and modification.

There is only one listing in the yellow pages this month. I'm afraid it's quite lengthy, and so the monthly disc might be a useful means of getting the thing into your system without errors. Because it saves files, I'd recommend that you allocate a whole DFS disc to it although it should work happily in any directory in all the filing systems. Once the program is entered, save it immediately, and then build a boot environment as follows:

```
*BUILD !BOOT
0001 MODE 129:CH."SURVEY"
0002
ESCAPE
*OPT4,3
```

Start up the program with Shift-Break. A front page will appear with the program title as part of a border. Inside this is the main menu. Remember that pressing Escape will always return you to this menu. In some situations you might have to press twice to get back to it because the Escape key is used to leave other areas of the program. The main menu gives the user six options: Files, Edit, Sort, Display, New and Exit. Any of these can be access by typing a number 1-6 then pressing return at the Which prompt.

The last two options clear memory and re-run the program, and exit the program back to Basic. They are provided so that badly developed surveys can be erased, and so that there is a legal exit route from the program.

## Creating a survey

The easiest way of learning how to use the package is to produce a survey. Once again you can use the collation sheet to design a short survey presentation. With the program running, press Escape to get to the main menu. Now select New by pressing 5 then Return.

Press 2 then Return to select Edit. A new menu appears. Press 1 then Return to select survey Title. When that screen appears just type the survey title and press Return. Remember that you can use the caps lock and shift keys to get upper and lower case. Once this is done the Edit menu reappears and the survey title replaces the top line of the screen from here on.

Next, still in the Edit menu, select section headings by pressing 2 then Return. A screen with up to 10 section headings appears. Use the cursor up and down keys to move to each line in turn, and press the Tab key on each line. This lets you type a section heading. Once the heading is typed, press Return and move on to the next section with the cursor keys. Remember that the caps and shift keys are available in this section. When all the headings are typed in press Return for the last time then press Escape to get back to the Edit menu.

From the Edit menu select option 3. The next screen is about headings, but it works differently. Move the cursor bar until it is highlighting the section you want to enter. Press Tab and a new screen will appear, which has a table of eight categories. The cursor keys move you up and down and left and right, between text and numbers. Simply move each left-hand text slot in turn, hit Tab and type in the category name in up to 10 letters.

Press Return after each one. Once these are entered, move to the right-hand side number column and enter numbers in exactly the same way, but of course only using number keys.

Once all the data is entered press Return a final time, then hit Escape to go back to the Edit menu. Now select another category and enter its data in the same way. Always work from the top down in section headings and categories, because the program uses empty slots to indicate the end of its data. If you need to change some data previously entered just move to it and press Tab to re-enter. The order doesn't matter here.

Once all the categories in the survey have been entered, pressing Escape twice will get you back to the main menu.

Data can be sorted alphabetically by name or by number. To sort a section simply select Sort at the main menu. Then select a section as above, remembering to press Tab (not Escape). Now the table of information appears. Only the left and right cursor keys work, so move the highlight bar to the text column or the numeric column then press Tab. The

chosen column will be sorted, and the other column will rearrange to suit. The program then returns to the Sort menu, so the process can be repeated if needed, in other sections.

### Displaying the results

This is where most of the hard processing goes on, but using the program is simple. The only problem is that it makes more sense to try to graph sections which have data in them! First select option 4 in the main menu. Now choose one of the display options: Table, Pie Chart, Bar Graph or Line Graph.

Again a section is requested and this is done as before. Once Tab is pressed the information is presented as requested. A message gives you the option of exiting from the display back the display menu simply by pressing space.

The P key can be pressed to start a screen dump to a black and white Epson-compatible printer. Unfortunately the routine is in Basic and takes about five minutes to complete, at which time the display menu reappears.

Remember to set up the printer before starting to print, otherwise the system may hang-up. The Escape key will cure this, but the graph will be temporarily lost!

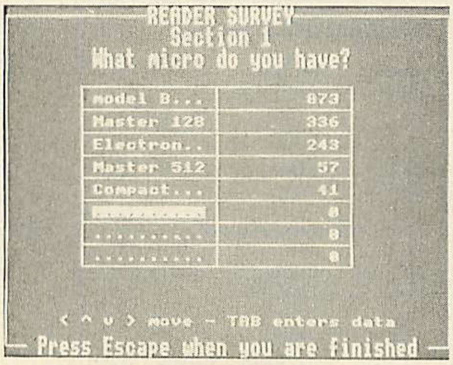
### Final option

The last options are in the file menu. These allow file handling to happen, so that surveys can be saved in electronic form. You can catalogue the disc, open or load a survey file, save a survey file or delete a file from disc. You can even print a draft copy of the survey. To catalogue the disc simply select option 1. Press Space to get back to the menu.

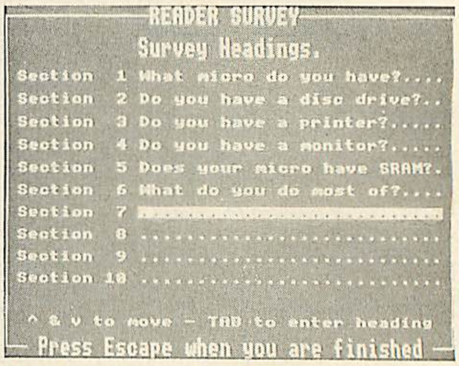
The next three options after selection simply require a filename to be typed in and Return pressed. A file will be opened, saved or deleted. Note that pressing Return by itself will generate a catalogue, from which you return to the appropriate Load/Save/Delete routine.

The idea of printing a draft file is just a fast check that the data that has been entered actually matches the combined data sheet. Remember that it is always wise to make sure the printer is set up before selecting this option.

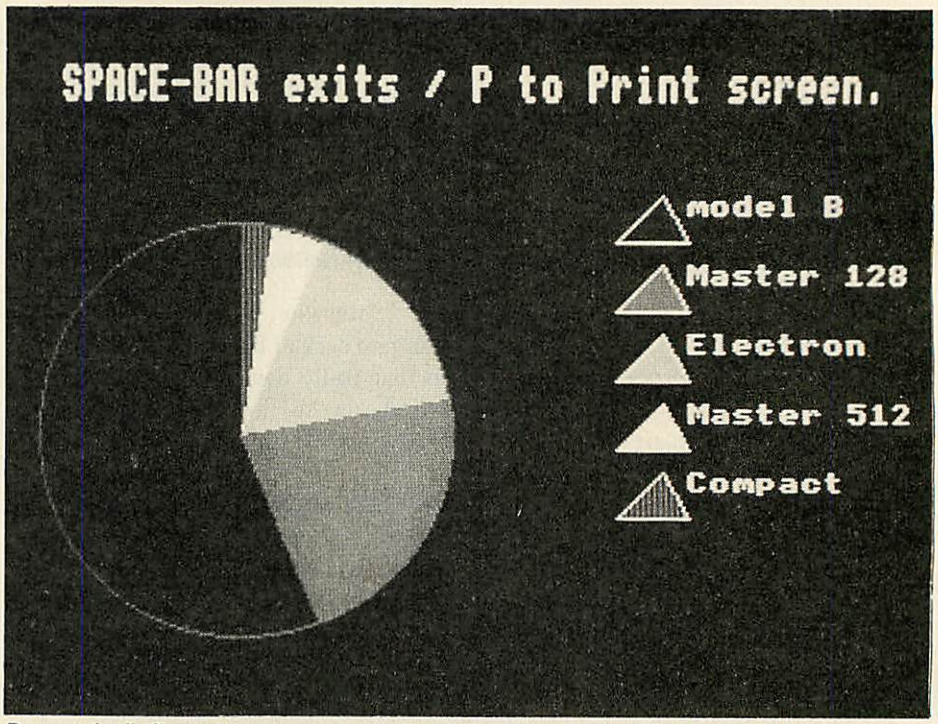
I hope that you find this program as useful as we did. It's certainly doing the rounds in local schools, but we'd be keen to hear from anyone who ends up using it for other purposes!



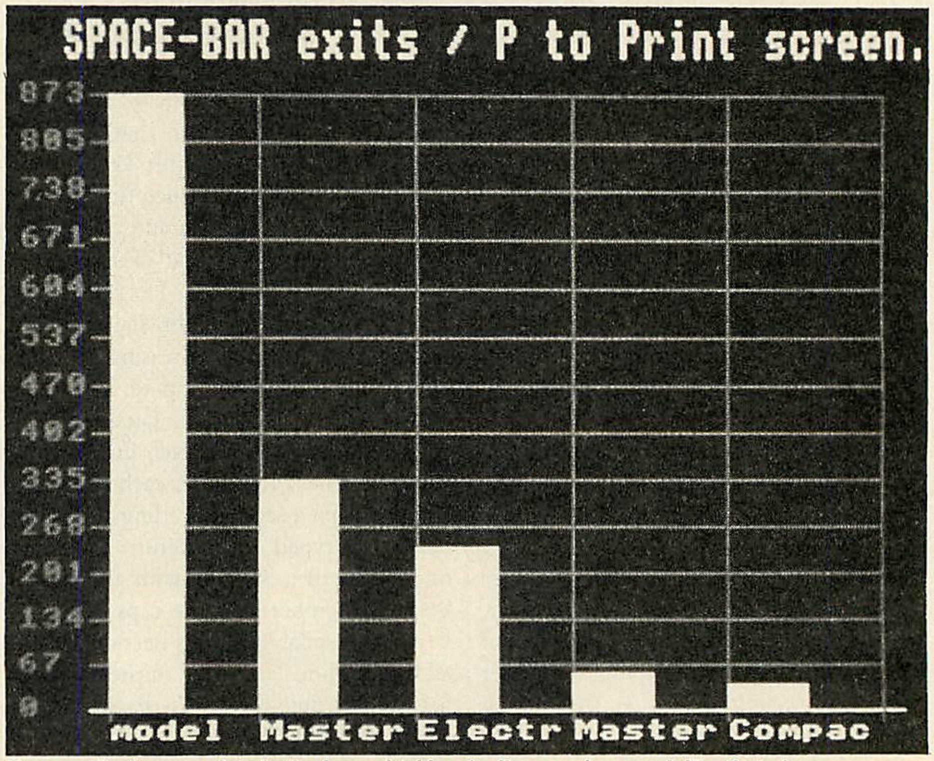

First stage is to specify a theme




Specify sections and subsections




Present the findings of your survey graphically before drawing your final conclusions




You can display your data in the form of table, pie, line or a bar graph like that above

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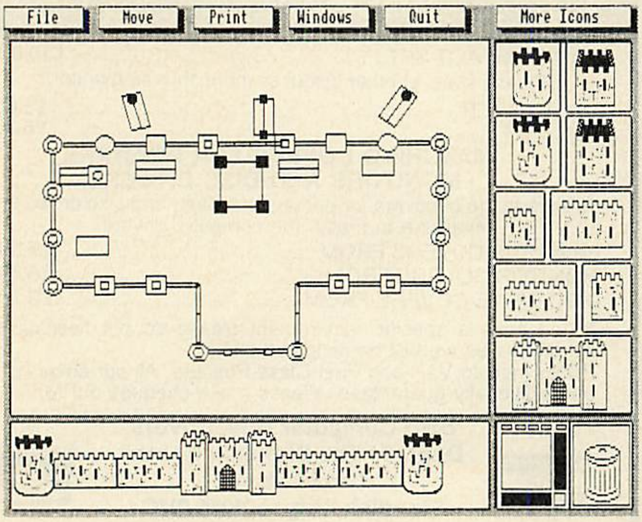
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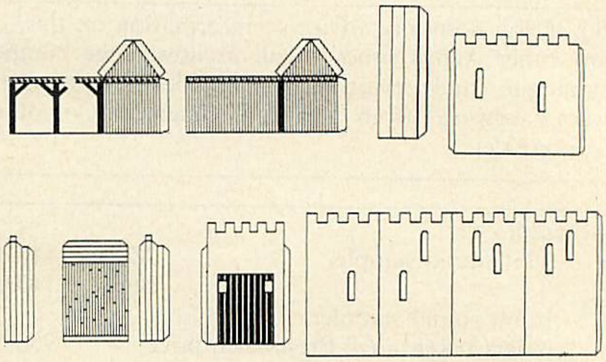
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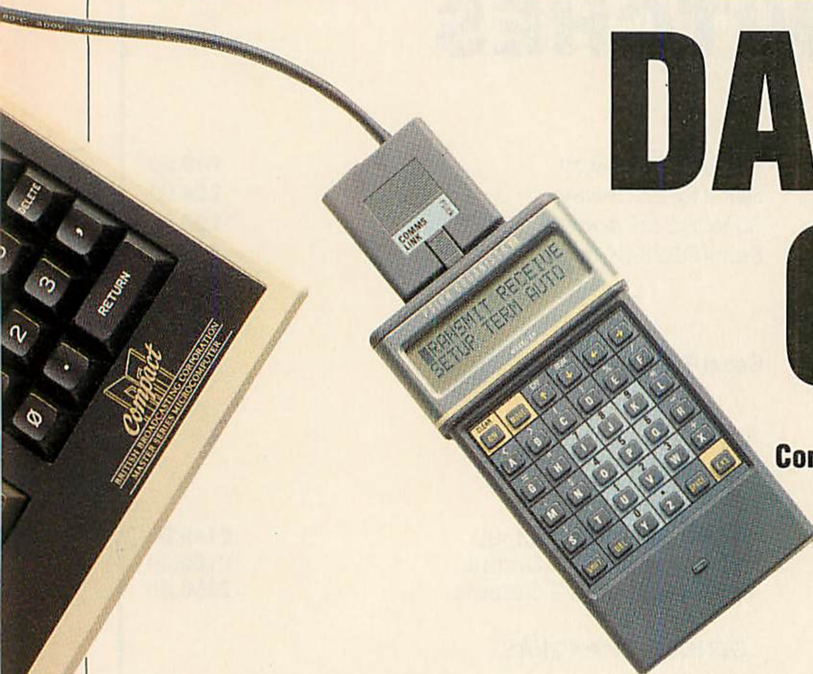
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# DATA GETS GOING

**Connect up your Psion Organiser to back up and edit your portable data**

*Simon Hewitt*

The Psion Organiser 2 is a handy, oversized calculator-like gadget that's great for keeping all sorts of data close by. It's familiar to many as the tiny machine used at Marks & Spencer's tills to check the prices of shirts. But it's also good as a data-entry system, and is often used in the field as an 'electronic notebook'. The main drawback is also its biggest asset – its size. The keyboard is tiny, with lentil-sized buttons and a miniscule screen, and that's not good for entering and editing the data you need.

Listing 1 in the yellow pages is a program designed for managing datafiles created using the Psion Organiser. The program allows the exchange of files between the Organiser and a Master-series computer. It'll work on a Master 128 or Compact, and even on a normal Beeb if you have a 6502 second processor and a copy of Basic 4 and GXR. At its simplest, you can use the program simply to backup the data held in your Psion on floppy disc. But there's also an editing routine that allows you to enter and edit the data on the better keyboard of your BBC micro, and then return it to the Psion. The editing and file management routines are only included in the full version of the program on the monthly disc. The length of the listing means only a cut-down version can be included in the yellow pages.

The Import and Export routines of the program may also be used for the transfer of Psion procedure files, but the program itself can only be used to edit normal datafiles. Procedure files can be edited with a wordprocessor on the Master.

To transfer data between the two machines, a serial link is used. The Psion Comms link (which is intended for the IBM PC), plus a suitable adapter for the BBC end is necessary, and you have to set up comms parameters such as the baud rate and parity at the Organiser end of the link – the program doesn't do this for you. For the transfer to work properly these parameters must be set correctly before you start. Remember, you can save the parameters in a setup file on the Psion if you want to.

To backup a Psion file, all you need to do is import it from the Psion and store it on the BBC micro's disc – it won't work with cassette. But to edit the file, the program has to translate the date into its own BBC-type format – which it finds easier to deal with. It is this file that is edited. There's a menu option in the full version of the program to do this translation, and then you have to select the file as the 'working' file before you can inspect and change it. After editing, the data can then be re-translated back into the Psion's own format, and re-exported to the Organiser.

The translation between the two file formats is fairly simple. It can't cope with any errors in the incoming Psion file, and it takes the first blank field as the end of the file. So any data that comes after a blank field in a Psion file is lost if its transferred to the BBC and edited. The BBC format consists of records of data with a set number of fields of fixed length. This is done to make the editing part of the program as simple as possible. The number of fields is set at eight, each of which has a length of 34 characters, though you could alter this. The BBC format filename used when the data is stored on disc is the same as the name of the Psion format file, but with '_b' added to the end.

Translation back to the Psion format removes any blank fields, and any trailing spaces from fields, so that the memory space which the data takes up in the Psion is minimised.

When you type in and run the program, a menu of options appears. To select an option, type the appropriate number, then confirm the highlighted choice with 'Y'. If you don't type 'Y', your selection will be ignored.

## Available options

The first option is to import files from the Psion to a disc file on your Beeb. After selecting the option, you'll have to type in a name for the file in which the data is to be stored. It's sensible to use the same name as the Psion file. The program checks that the file doesn't already exist – if it doesn't, you'll get a prompt to start the Transmit option on the Psion by pressing the Exe key.

This means that you have to get the Psion ready to transmit – but don't press the Exe key to actually start the process until you get the prompt. And of course the serial port has to be set up properly. The table shows how you should set the Psion end of the link.

Similarly, the Export option requires the name of a file on the BBC disc. The program checks that the file exists, then

prompts you to start the transfer at the Psion end: press the Exe button on the Psion at the prompt.

The other options on the main menu allow you to do a star command (like *Cat), select and edit a working file (if you're using the full program version), or leave the program.

You can type in star commands with or without the star. The program checks some commands to make sure you don't overwrite the program and data in memory – for example *Backup would do this. However it can't check all the possible commands, so be careful.

## Psion data editing

Once you have a Psion file transferred onto a BBC disc and a new copy created by translating into BBC format, the data can be edited. All the editing parts of the program make use of the 'working file'. The name of this file must be typed in using the Work File option on the main menu, and this then gives you access to the other two menus.

These contain new options to examine and change the data in the working file. If, when you set the working file, the BBC version of the file already exists, then you can edit it directly. If not, then you can create the BBC format version straight away.

Although it is the BBC format file that is changed by the editing procedures, both the BBC and the Psion format files must be on the same disc and in the same directory. Each file is marked with a special identifier when the program creates them – and this ensures that you can only edit and export proper files created by the program. When you enter the name of the working file, the program checks that both the BBC and the Psion versions exist, and that they contain the correct identifier.

After editing, remember to translate the edited BBC version back into Psion format before exporting the file back to your organiser – otherwise you'll export the original version. In the same way, if you make any changes to the file on the Organiser, then they'll only appear in the BBC version of the file after you've translated it back.

Picking the View/Edit option from the main menu leads to the second menu, which offers various editing functions. The File Management option leads to a third menu, which contains the file translation options and allows you to see or alter various default and status information – like the age of the current working file, or the length of the records and fields used when translating between Psion and BBC formats.

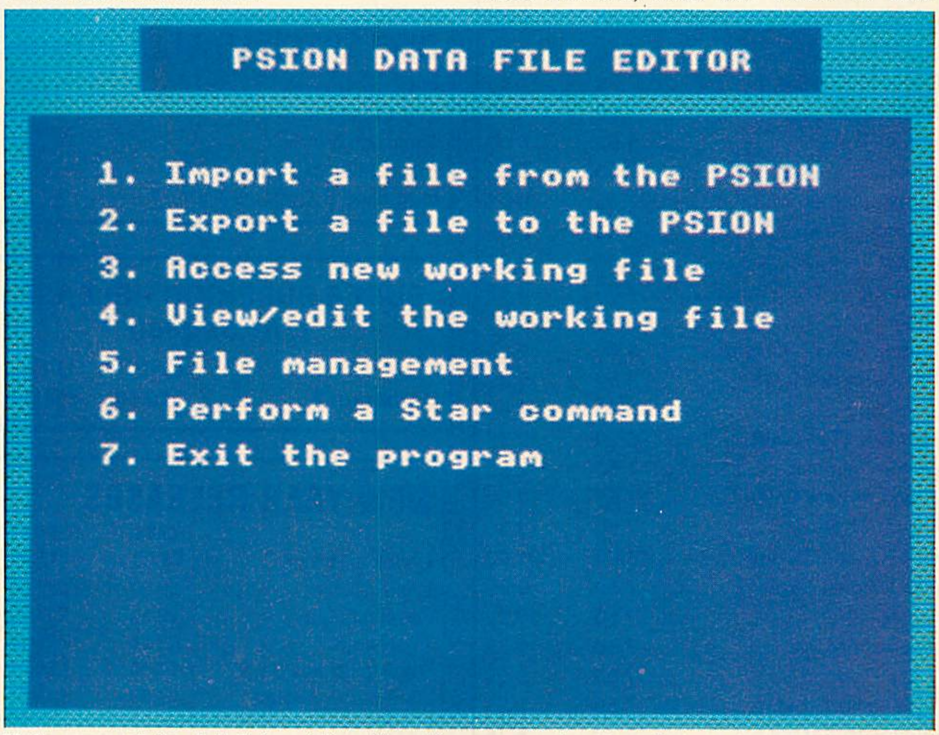
## Viewing and editing data

The first item on the View/Edit menu is 'View a file'. This displays the contents of a file on screen, record by record. The program asks for the first record you want displayed, and you can move to the previous or next record with the left and right arrow keys.

You can also delete a record by pressing Delete – but for safety's sake you will have to confirm your choice. Escape takes you out of this option, back to the main menu.

The Search option allows you to display only those records that contain a specific bit of text – say a town name or part of a phone number.

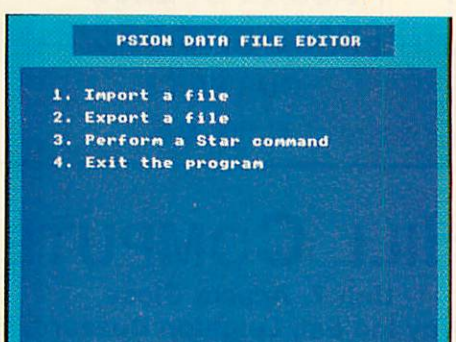
You can type in the search string, and also specify a particular field (say number 3) to search in. If you don't specify a field number, then the whole of each



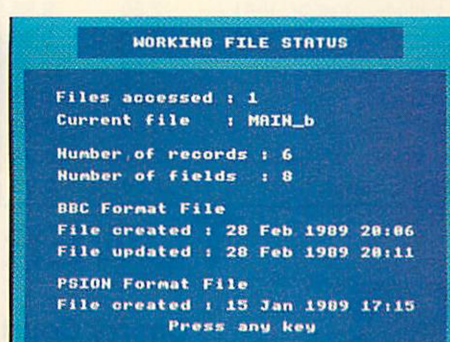

**Main menu of the full Psion data editor. Press a number to select an import or export option then confirm it by pressing the Y key**

### PSION SETUP PARAMETERS

| | |
|---|---|
| Baud | 4800 |
| Parity | Odd |
| Bits | 7 |
| Stop | 1 |
| Hand | XON |
| Protocol | None |
| Echo | Host |
| Width | None |
| Timeout | None |
| Reol | <CR> |
| Reof | <Sub> |
| Rtrn | None |
| Teol | <CR> |
| Teof | <Sub> |
| Ttrn | <None> |




**Limited menu of the cut-down version on the yellow pages. You can still use the import and export options to back up the data held on your Psion Organiser 2**




**You can keep track of different files held on the Psion: the program datestamps each backup file, and stores how many records are kept in the file**

record will be checked. Once you've typed in the string and possibly the field number, the program searches the data and displays the records that match your choice.

As each matched record is displayed, the program pauses until you press a key. You can stop the search at any time with Escape, otherwise at the end of the search, the number of matched records is shown.

The Print option on the menu allows you to print out all or some of the records in the data. The program first asks whether you want a 'selective print', in the same way as the Search option. If the answer is 'N', then the whole of the file is sent to the printer. If you answer 'Y', then you can type in a search string and possibly a field number, and only records matching your choice are printed out. One warning – Escape can't halt the printing, so make sure you really want what you say you want.

The fourth option on the View/Edit menu allows you to add a new record to the data. You can add it anywhere – you are asked where you want to insert the new record, and you can type in any number between zero and the number of records plus one. Zero takes you back to the main menu.

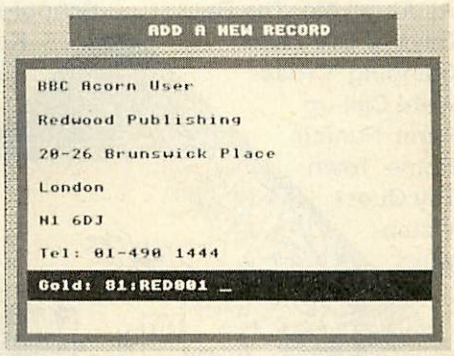
Other numbers insert a new record into the data, with higher numbered records being shuffled up if necessary. A blank form is shown on screen, with the highlight bar over the first field. Type in the text for the field, then press Return to move to the next one.

The program won't accept a blank field within a record, so it takes the first blank field as the end of the record. Once you've typed in all the fields, the new data is added, and the program goes back to the main menu.

The most useful option is to Edit the records. You must type in the record number and the record will be shown on screen. The first field is highlighted, and you can move the highlight bar up and down with the cursor keys. The left and right keys move to the previous or next record, as with the View option. The Delete key deletes the whole highlighted field, and pressing Return inserts a new, blank field. Once the bar is on a field you want to change, press Copy, and you can edit the field. The cursor can be moved with the cursor keys, left or right, or to the beginning or end of the field. Return ends the editing of that field, and puts




**Selecting the Edit menu then allows you to insert new data into the Psion datafile**




**Records can be edited using the keyboard and display of your Master series micro**

the new version of the field back into the data file.

While editing, you can also type in any special characters you need, by pressing Tab and then their Ascii code between 128 and 255. Pressing Escape takes you back to the menu.

The last option on the menu allows you to sort the records in the datafile into alphabetical order. You are asked which field number should be used for the sort – and the program goes back to the menu if you don't type a field number in. Once the field is specified, the sort starts. As the program uses a simple sort, it will take some time, and a row of up to 10 asterisks is shown to indicate progress. Escape can be pressed to stop the sort before it's finished, in which case only the first part of the data will be in alphabetical order.

## File management

There are four new options on the File Management menu. The first two allow you to translate files between the Psion and BBC formats. Remember, you can only edit files in the BBC format, and only export files back to the Organiser if they are in Psion format.

When you select the working file for editing, if there isn't already a BBC format version of the file, you are prompted to create one. So you don't need to use Psion-to-BBC menu option if you've just imported a file and want to edit it. But it is useful if you have already made some changes to the BBC version of a file and then decide you want to go back to the original. You must select the BBC-to-Psion option before you can send an edited file back to the Organiser.

If you make any changes to a BBC format file, then when you select some menu options the program notes you have made the changes. If the next action would lose your edits, then you'll be asked to confirm whether you want them put into the Psion version of the file. If you want to forget the changes, reply 'N', otherwise press 'Y' and the edited file will be 'archived' back to the Psion format file.

The Change field lengths option allows you to change the number and length of fields stored in the BBC version of the data. A blank record form appears, and you can use the up and down arrow keys to choose a field.

Press Copy to alter the field's length. If you type in zero for the length, then all fields after that one will also be set to zero – zero-length fields are not allowed in the middle of a record. The maximum number of fields is eight, and each can be up to 34 characters long.

Escape returns you to the main menu, and also translates the Psion format file to BBC format – thus creating a new BBC version of the data with the new field lengths.

The last option allows you to see the status of the current working file. The screen displays the number of working files that have been used during the session, the name of the current working file, and the number of fields and records in it. It also shows the date when the BBC file was created (when it was translated from Psion format) and when it was last edited, plus the date of the Psion file (when it was imported or translated from the BBC version). This allows you to keep track of the ages of backup copies of files and so on.

This program certainly makes using the Psion less tense – in particular when you change batteries. The ability to backup your data on a disc attached to your BBC micro adds extra security to the process. If you get the fuller version off the monthly disc, then editing the data is also much more convenient than trying to use the Psion's tiny keyboard.

# ARITHMETIC ON THE DOT

**We conclude our look at floating point instructions by showing you how to put constants in your programs**

***Tim Chappell***

Last month's article showed you how to use the Archimedes floating point emulator, and introduced the complete set of floating point instructions that you can use within your ARM machine code programs. Basic 5 can't handle the assembly of these instructions itself, and so on last month's *BBC Acorn User* monthly disc, there was a Basic library program that allowed you to assemble the floating point instructions. So you could include the line:

```
EQUS ("MNFEAL F1,F0")
```

in your listing to assemble an MNF floating point instruction. But with last month's program, there were still a number of problems with assembling floating point machine code.

This month, there's an improvement to the original floating point assembler program. Due to the length of the listing, it can't be carried in the yellow pages, but the whole thing (the original plus the improvements) are on this month's disc.

The improvements to the original encoder provide several new features. The original demanded that each instruction carried its condition codes – so AL (meaning the instruction is always carried out) wasn't optional as it is with the normal Basic ARM assembler.

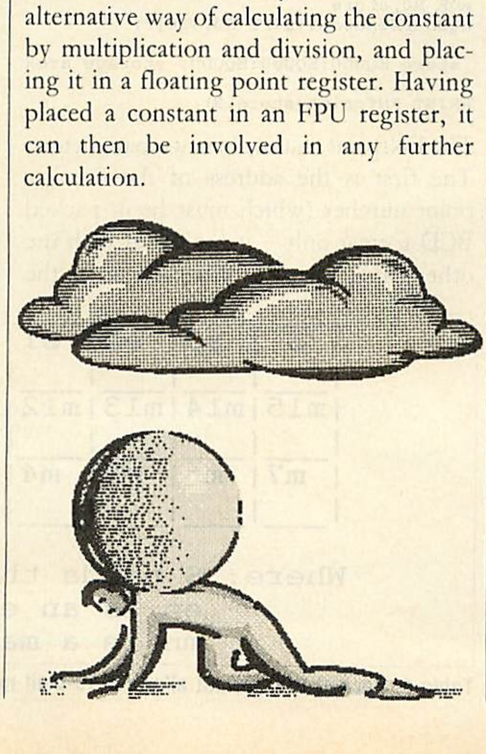
The second problem was storing floating constants like 10.2345 in your program. For integers, you can use EQUD to put a 32-bit value into memory, but there was no equivalent for floating point numbers.

The third problem is that of input and output. Printing a floating point number is difficult. The new version of the library program fixes all three of these points.

If you have experimented with the floating point facility included on last month's disc, you will no doubt have found that although its facilities are very powerful, it lacks an easy way of incorporating constants into calculations. For example the following calculation would prove very difficult to arrange:

```
F0 = F0 * 1234.567E-89
```

The co-processor has eight inbuilt immediate mode constants, which are useful for many calculations – but their range is limited. If the calculation you wish to carry out doesn't involve one of the inbuilt constants then you must find an alternative way of calculating the constant by multiplication and division, and placing it in a floating point register. Having placed a constant in an FPU register, it can then be involved in any further calculation.



There are several ways to do this. First, if the constant is an integer and can be stored in an ARM register, it can be transferred from there to an FPU register using the FLT instruction:

```
MOV R0,#32
EQUD FNencode("FLTE F0,R0"); F0=32
```

But this method is limited – only integers can be transferred, and many constants will not be integers. You are also limited to the 32-bit size of the ARM register.

Second, if the constant can be calculated using the FPU instructions, then this may be useful. So to place the value of pi in F0, use:

```
EQUD FNencode("MNFE F0,#1")
EQUD FNencode("ACSE F0,F0")
```

This works because pi is the arcosine of -1 (remember the trigonometric calculation work in radians).

Third, you could manufacture the constant by multiplication and division of either immediate constants or integers transferred from the ARM registers.

But the best way to do this is to load the constant directly from memory. This provides an adequate range of constants from 9E+9999 to 1E-9999 with 18 decimal places.

To store a constant in memory and then load it into an FPU register, you need to be aware of the format in which the FPU stores its numbers. There are in fact four different formats in which a register may be stored: single precision, double precision, extended double precision and packed binary coded decimal – the same as the four precisions that a number can be kept in. It is packed BCD which is of most use to us, since it is easier to convert normal scientific nota-

tion into this format. The format requires three 32-bit words to store the constant in, with the format shown in table 1.

Each decimal digit in a BCD number is put in four binary bits – so 205 would become 001000000101. The top four bits of the 96-bit packed BCD are the sign bits saying whether the number is positive or negative, and the nibble is arranged as follows:

```
 | M | E | 0 | 0 |
 |___|___|___|___|
```

M is the mantissa's sign, E is the exponent's sign. If the bit is set, it means the number is negative. A number like 1.23E-4 (0.000123) has a clear (positive) M bit but a set (negative) E bit.

The routine in the new version of the floating point assembler provided on the May monthly disc converts a number passed to it in string form, into the corresponding 12-byte string which represents the constant to the FPU. Since the routine always returns a 12-byte string, there is no need for an ALIGN directive following an included constant. Constants may be introduced into a program using

```
EQUS FNfconst("number")
```

Where the 'number' string is one of the following forms:

```
+/-mmmmm.....           -3456
+/-m.mmmm                3.456
+/-mE+/-eeee            -6E-23
+/-m.mmmmE+/-eeee        6.789E10
```

STR$ (value) is also acceptable where value is a normal Basic variable.

The number for conversion is passed as a string because this allows numbers of much greater precision than Basic itself allows to be included as constants (otherwise Basic would round them to its usual nine or 10-digit precision before passing them to the routine).

The following code can be used to transfer a constant from memory to an FPU register:

```
..
ADR R0,const1
EQUD FNencode("LDFP F0,(R0)")
..
.const1 EQUS FNfconst("22.12E-69")
```

The ADR directive points the ARM register R0 to the storage area for the constant, and the LDFP command loads the BCD constant 22.12E-69 into F0.

To convert the number stored in packed BCD form to one of the other formats so it can be used in double or extended precision arithmetic, you use:

```
..
ADR R0,value
EQUD FNencode("LDFP F0,(R0)")
EQUD FNencode("STFE F0,(R0)")
..
.value EQUS FNfconst("11.04E-66")
```



This loads the value into F0 in BCD, then stores it back at .value in extended precision. Extended precision takes up three 32-bit words just like the packed BCD format, so you don't need to reserve any extra space.

This is particularly useful if you wish to carry out further calculations on the constant and don't wish to lose any accuracy. Storing a value in extended precision format ensures no further loss of accuracy occurs.

The third improvement to the encoder allows output of floating point numbers from the unit. The routine will convert any packed BCD (P) format number into a string with a specified number of decimal places:

```
..
ADR R0,store
EQUD FNencode("STFP F0,[R0]")
..
.store EQUD0:EQUD0:EQUD0; storage area
]
PRINT FNfprint(store,9)
```

The FNfprint routine has two parameters. The first is the address of the floating point number (which must be in packed BCD format only – it can't deal with the other three formats). The second is the number of decimal places required (so in the above example nine decimal places will be returned). This can be any value between 0 and 18.

Note that although there are a maximum of 18 decimal places, you can't always rely on all of these. Calculations in other precision modes will limit the precision of the calculation result. Generally, if a calculation has involved a single precision number, then only nine digits will actually be significant and for a double precision calculation only 17 digits. Note that the instructions FML, FRD and FDV are only calculated to single precision accuracy.

Since the routine returns a string, then you can convert it into an actual Basic variable using the Basic VAL instruction. Two words of warning – because the floating point system can manipulate numbers far larger than Basic, then an error may occur if the value is too large for a Basic variable to hold.

Similarly some values will be too small to be held in a Basic variable, and will be rounded to zero. Second, remember to assign the value to a floating point variable. So x=VAL string$, not x%=VAL string$.

As a bonus, you can check with the FNsuitable routine that a number can be expressed properly by a Basic variable. This it will return TRUE if it can, or FALSE if it is too large or small. The following is an example of its use:

```
IF FNsuitable (address,places) THEN
   A=VAL(FNfprint (address,places))
```

The two parameters required for the function are the memory address of the number to be checked (in packed BCD form) and the number of decimal places required.

That completes the floating point encoder, and gives you all you need to make full use of the floating point emulator in your ARM machine code programming.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| S | e3 | e2 | e1 | e0 | m18 | m17 | m16 |
| m15 | m14 | m13 | m12 | m11 | m10 | m9 | m8 |
| m7 | m6 | m5 | m4 | m3 | m2 | m1 | m0 |

Where: S holds the sign bits
en is an exponent digit
mn is a mantissa digit

**Table 1. Packed BCD format allows a 19-digit mantisse and 4-digit exponent**

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# SCHOOL REPORT

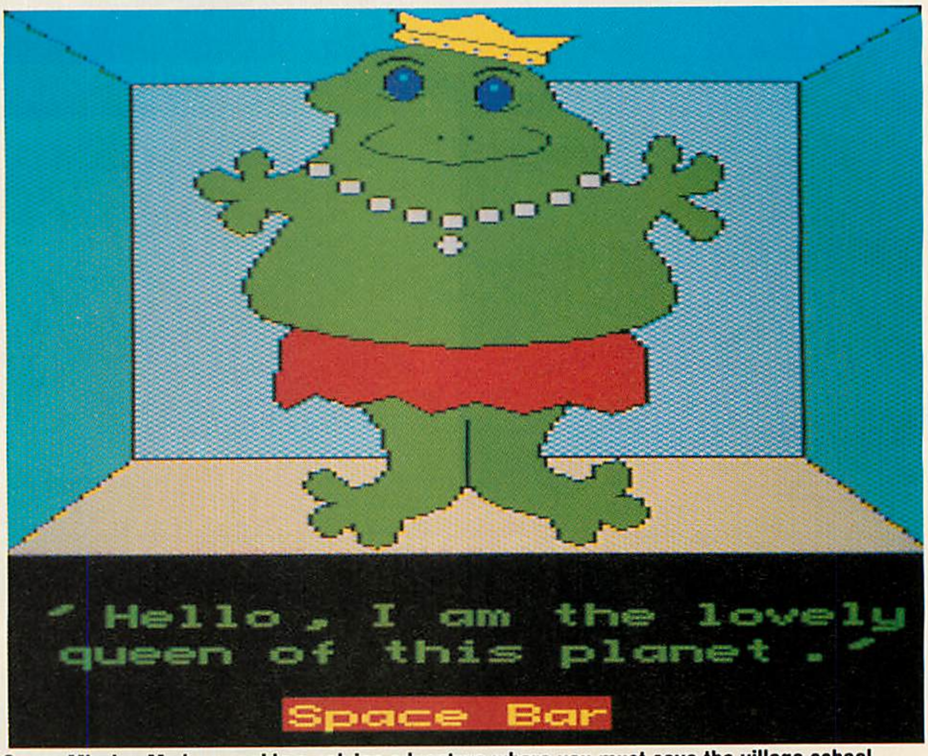
**The BBC micro plays an important role in both the classroom and home education. And the software just gets better**

***Nick Evans and Chris Drage***

The BBC model B and its Master series relatives still occupy a pre-eminent position in educational computing. There is no single micro that is used in as wide a range of activities, or across the whole age and ability spectrum. This makes the BBC micro uniquely appropriate for home education too, because it can meet the demands of all levels. and 'home education' was often the main reason for buying a BBC micro in the first place – after all, it's more expensive than the games-playing competition.

In choosing the best educational software for both home and school, we have decided to look at materials that are available by breaking the curriculum down by subject area. It is worth remembering that most educational software is not designed for home use – it is really intended for use in a classroom, with the help or direction of the teacher. Although children may find much value in using a particular package at home, it is possible that it would spoil future classwork should the teacher decide to use the same software later. Having said all that, consultation with the teachers at school is your best bet, and some useful collaborative work may be done.

Central to classroom language work is the wordprocessor. Arguably the most successful wordprocessing software available for this infant age group and right up to secondary level, is *Folio* from Tedimen Software. It's a completely child centred system, and multi-lingual versions of *Folio* also offer community language teachers a unique tool. *Advanced Folio* is now available and provides a variety of typestyles and printed formats. At secondary school, wordprocessing tools are geared more to those used in the 'real' world, and sophisticated systems like *View* and *First Word Plus* should be considered.




**Space Mission Mada: a problem-solving adventure where you must save the village school**

Another package which has earned itself an excellent reputation in language work is *Podd* from ESM. The endearing character encourages children to develop their word power in a game-like format. *Developing Tray*, a free program that you may be able to get from schools, is another old favourite. It's now up to issue two, and there is even a 'designer' version about. The 'Tales' group of programs from Resource and BBC Soft are excellent programs with which lower junior-aged children can easily combine pictures from the disc-based graphics library with their own text and special characters, to form pages of an electronic 'story book'. One version, *Ramayana Tales,* was reviewed in last month's *BBC Acorn User*. *Mystery Island* from Tressel takes the concept a stage further for older groups of pupils.

In the area of desktop publishing Sherston Software's *Typesetter!* is prob-

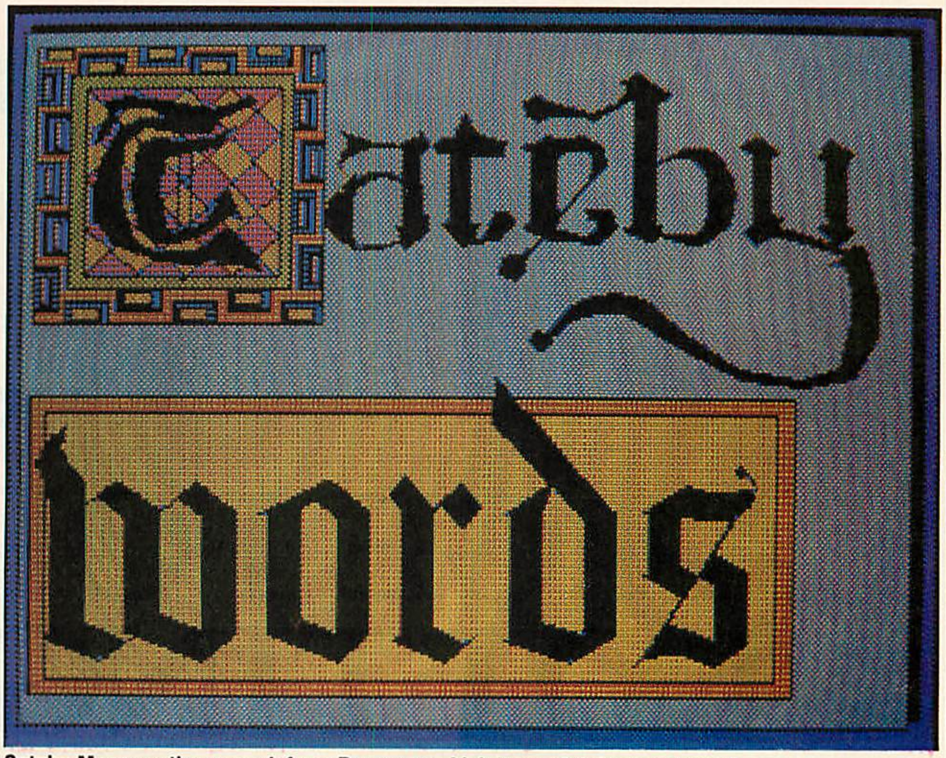
ably the most popular simple primary-level desktop publishing program. It allows you to define up to 64 boxes on screen, each of which may be used independently as a wordprocessing unit. Children quickly learn how to develop their own columnar layouts in newspaper fashion. *Typesetter!* has three sizes of headline text, and there are two fonts available, one of which is especially suitable for younger primary children. Moreover, *Typesetter!* can exploit the character set of your printer, so that if you are able to print in Near Letter Quality, the print-out will use that style for its main text. *Typesetter!* may also be used on more than one machine at one time in a school, through a clever key-disc system.

*Front Page Special Edition* from Newman College builds on the success of predecessors of *Front Page* and *Front Page Extra*. Every classroom ought to have one of these simple utilities, just to be able to present work as a block of text arranged around a picture drawn by the child. *Special Edition* allows more sophisticated work to be undertaken, including full page printing and the use of a wide variety of fonts.

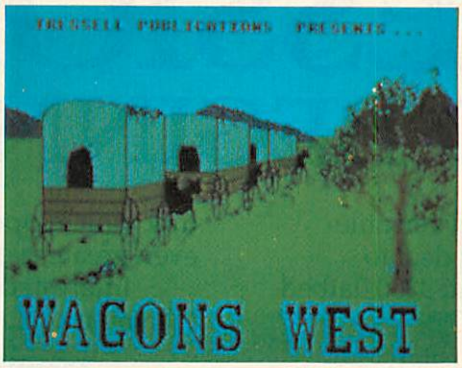
*Pixel Perfect* is our current favourite for a Beeb-based desktop publishing system. It is very similar in many respects to *Stop Press* from AMS, but it has the added advantage of being disc-based and therefore it is portable. *Stop Press* is more portable in the Master series version, but it does require each machine to have a mouse. AVP's *Pixel Perfect* on the other hand is controlled entirely from the keyboard.

This may seem a disadvantage on first viewing, but experience shows that there isn't as much to gain by using a mouse on the Beeb and Master than there is for example on a Macintosh. *Pixel Perfect* comes with a range of fonts and graphics, and there are special packs of materials developed for particular educational topics – notably biology and anatomy. The quality of print-out from this software is as good as any from a BBC system. An Archimedes version of the package is now available and fonts and graphics are fully transferable.

In mathematics, the computer can play a major role by providing opportunities for problem-solving. Straightforward but inspirational software includes *Slimwam2* (from the Association of Teachers of Mathematics), *Microsmile First 31* and *The Next Seventeen* (from the Smile centre). These are suites of software dealing with a wide range of investigations and problem solving.



**Cateby Manor: a theme pack from Resource which has a database approach**



**Early America relived with Wagons West**

The two *Maths with a Story* packs also pose problems couched in simple language. There are many excellent adventures based on problem solving: *Droom* and *Dust* (Resource), *Wizards Return, Animal Rescue,* and *Space Mission Mada* (Sherston Software) are particularly recommended. *Giant Killer* from Topologika successfully marries the 'traditional' adventure style with a mathematical problem-solving medium for older pupils.

A simulation program which sets high standards is Cambridgeshire Software House's *Cars – Mathematics in Motion*. All manner of mathematical concepts come into play: angles, ratios, percentages, probability, arithmetic and so on. *Tessellations* from Cambridge Micro Software is another very impressive and powerful tool; it allows you to draw tessellating shapes, with the computer automatically providing symmetry in any one of 17 possible symmetry groups.

*Numerator* – reviewed in March by Martin Phillips – has been likened to a 'mathematical construction kit' which offers an exciting means of tackling investigations into number processes. Being graphical, children can see what is going on mathematically.

Logo provides perhaps the most creative mathematical environment on a computer. This accepted standard version for Acorn computers comes, like *Numerator,* from Logotron. It has many extensions covering control, 3D-graphics and music. Logotron's Archimedes version offers a superb programming environment, both appealing and familiar, in which children may explore turtle graphics and list processing. It's significantly improved over the 8-bit Beeb version, and it now provides what must now be the finest, microcomputer Logo environment in the world.

In the sciences, the *Dudley Programs* published by Heinemann comprise three quality 'theme-packs'. *Moving Molecules* and *Rainbow River* from Cambridge Micro Software are excellent simulations. The BBC Science Series software provides science classes with a good, broad CAL (Computer Assisted Learning) approach to teaching. Although CAL-type teaching materials can't usually be recommended,

these packages provide excellent revision software on a wide variety of topics for examination students. So it's quite sensible to suggest that a student revises the Mole concept or the principles of electrostatics by reference to these easy-to-use teaching packs. Many of them come with audio cassettes using the computer synchronised audio (CSA) technique to link the commentary to the software. In this instance, it is also feasible to use them with the teacher in control.

*Pond Life* and *Seashore* from GSN Software are superb resource packs that link children's practical work in life science to IT in a truly realistic manner. Using a pictorial key, common creatures can be identified, then the datafile interrogated for further study.

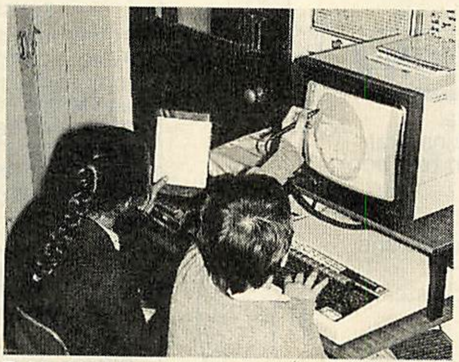
The Lego Buggy is an excellent introduction to control techniques at all levels, especially when it is used in conjunction with the Resource interface which attaches it to the compiler's user port. Since the unit is made from Lego bricks, it is possible to re-use the components for other tasks. A full range of exercises is provided as part of the documentation of this low-cost computer-controlled vehicle.

A computer is often called a 'simulation machine', because one of its greatest strengths is giving a 'vicarious experience' through simulation software. Although a computer program can never replace the concrete experience of learning and discovery, simulation software used within the humanities curriculum can form an important part of the children's range of learning experiences, encouraging a great deal of thinking and discussion.

For young children Noricc's *Supermarket/Shops* and *Camping* both provide a very good starting point. Other excellent high quality resource packs to consider are *Wagons West* from Tressell Publications, *Normans Resources Pack* from Fernleaf Education Resources, *Police-Language in Evidence* from Cambridgeshire Software House and 4Mation's *Bush Rescue*. Arguably the ultimate package representing historical, geographical and sociological issues is *Forge* from Resource, which focuses on the industrial revolution. Other excellent theme packs taking a database approach are *Castle Pack* and *Cateby Manor*, also from Resource, and Armada Resources Pack from the NELB.

When it comes to looking at databases, there are two important things to remember: the first is that a database is a set of information stored and retrieved electronically. 'Database' refers to the information itself. The system which handles that information is called the database management system. The second point is that systems designed for education are different from those aimed at business and industry. The emphasis in education is on simplicity and ease of use, whereas in industry it must be upon capacity and speed. In each case, there are sacrifices to be made.

Four main educational databases are available: *Key*, *Supastore*, *Find* and *Grass*. All of these have their advantages, and may all be wholeheartedly recommended. But the hands down winner for school and home must be *Key*. This package costs so little that it is practically given away! The ITV Association, which markets it, make its money from the excellent range of support datafiles and



**Robin Light Pen: introduces computer graphics**

complementary resource materials that go along with this full-featured system. New versions of the software are soon to be available, enabling ADFS use on Masters and Compacts, and distribution on Econet. A wide range of utilities already allow importation of files from other database management systems, and the easy creation and editing of graphics for mapping the dataset.

*Key* is suitable for use at all levels of education, since it has single-key operation as well as a powerful interrogation language, for more capable pupils and more complex tasks.

For craft design technology *Designer Castles* is definitely the educational package of the year. It was extensively reviewed in *BBC Acorn User* in March 1989, and is a set of materials for designing castles. These can then be printed out on paper complete with glue tabs. Once cut out, folded and assembled, the models are surprisingly strong. One extra benefit is that model layouts may be saved, and The Times Network for Schools (TTNS) maintains a Castles database, so that a variety of layouts is already available for down-loading. The software follows good design principles, allowing you to see the building in both plan and elevation view, and it is easy to edit and modify in response to new design constraints. The documentation offers some advice for curriculum integration too, and it is hoped that follow-on software dealing with medieval villages and manors will soon appear.

The BBC's *Technology and Design* packs are a must for secondary school level, since they provide a set of ready-made modules addressing a number of issues in CDT. Linkages, gears and pulleys, or straightforward design problems like 'what makes a product successful' are tackled in a simple way. The packs are multi-media, and there are video and audio tapes in support as well as documentation and books. The two packs may be used as a coherent set of materials, making a progression through a course, or it may be dipped into as topics arise in the design classroom. Elements of these materials are suitable for top junior use as well and this may be a good way of beginning communication between feeder and secondary school.

Adventure programs provide a fascinating medium for motivating children, developing problem-solving skills, and for encouraging analytical and strategic habits that are going to be useful in later life. They can convey an educational 'message' cunningly concealed in the structure of the game. 4Mations *Granny's Garden* has become the classic among infant adventure software; children love the graphics and ditties. But the range of quality adventure software for younger children is considerable: typical of the best language-based adventures are *Pip goes to the Moon* and *Yellow Brick Road* from Noricc, Alberts House from Resource and *Teacher's Cupboard* from Sherston Software.

For older primary-aged pupils, three programs can be described in superlatives: Resource's *Archimedes Droom* and *Bush Rescue* and the award-winning *Worlds Without Words* both of which are published by 4Mation. The former admirably demonstrates the promise of the Archimedes in the primary classroom. And the 4Mation programs are both innovative and thorough.

Finding secondary adventures tailored

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| | | | | | |
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| SINH | COSH | TANH | SECH | COSECH | COTH |
| ARCSIN | ARCCOS | ARCTAN | ARCSEC | ARCCOSEC | ARCCOT |
| ARCSINH | ARCCOSH | ARCTANH | ARCSECH | ARCCOSECH | ARCCOTH |
| LN | | | | | |

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### DID YOU KNOW

Pythagoras, born 569 BC, was the founder of a secret cult based on mathematics and mysticism.

The *Pythagorean Brotherhood* believed in reincarnation, took a vow of celibacy, and were forbidden to eat peas.

The local people became disgusted, and burnt them out!

to your child's own syllabus requirements is very unlikely, but an adventure generator offers some sort of solution. *The Last Adventure* from LTS is flexible enough to accommodate most of the required permutations and subtleties, and it allows for rapid and efficient structuring and input of the relevant information.

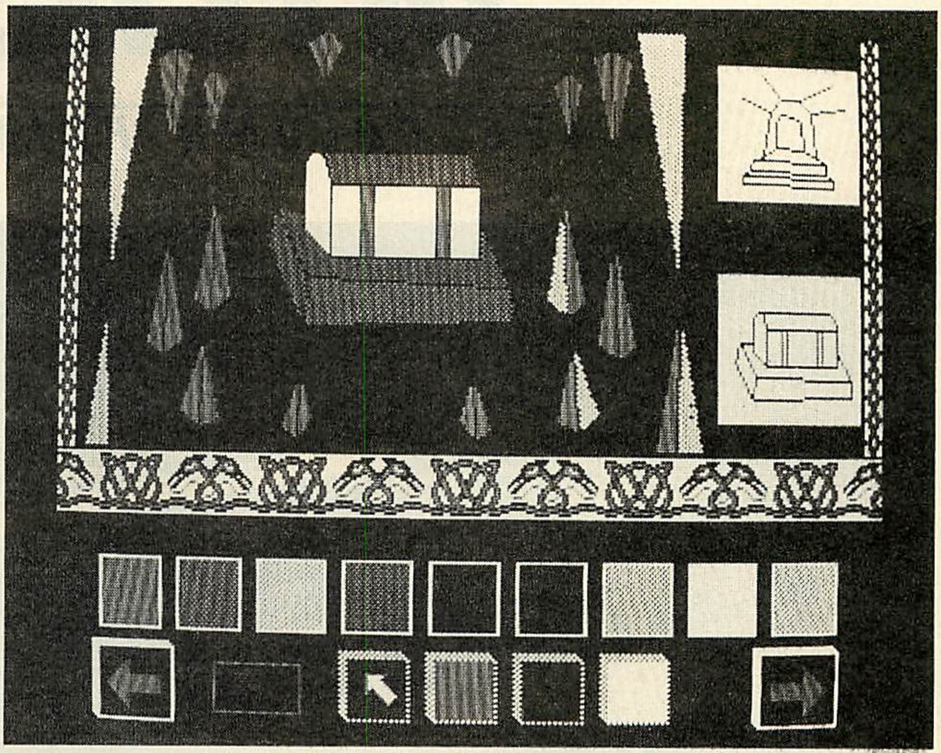
RBRC is becoming noted for providing a wide range of business simulations in an adventure game format. The success of this sort of material depends on motivating the child to take part. With your business collapsing around you because of poor forecasting, bad industrial relations or the plummetting value of sterling, you soon find yourself deeply involved in the decisions that are made every day in real world companies. RBRC produces a range of software which tackles several issues including running a cement company and dealing with crises.

The world of computer graphics can be introduced successfully to the young children with the Robin Light Pen and its accompanying *Paint-Brush* software. The strength of the package is its simplicity, letting children get down to work creating vivid screen images almost immediately.

A logical progression of skills is offered by *Picture Craft* from BBC Soft. This package is designed for children between 6 and 14 years of age. This very flexible program allows children to design and create pictures, which may be saved and used later in a number of games and puzzles. It provides considerable insight into a composition of shape, patterns and design.

A very good general package for the secondary age group is *Image* published by Cambridge Micro Software. As well as providing comprehensive drawing and painting facilities, it caters for a wide range of input devices – mouse, keyboard or whatever. Another feature which sets *Image* apart is its ability to import screens from any number of sources, including video if you have a digitiser, and its capability to be configured for use in a number of systems and with a wide variety of printers.

Clares' Archimedes programs *Artisan* and *ProArtisan* have conquered the secondary school graphics and art market with sensational colours, stunning image-handling tools and a lively presentation. This software is helping some Arc-



**Worlds without Words from 4Mation: an innovative adventure game for young children**

equipped schools to come close to industrial quality artwork.

The favourite pack for music must be the *Music Processor* from Mid-Sussex Software, which allows you to create a musical score with up to eight parts, and then take out and modify individual parts, then you can add them back into the whole score.

A full transposition facility is available, and the music is printed in quite reasonable quality – complete with everything except interpretation comments. These can be provided on Letraset, to be added to the score after printing. This software works well and is in actual daily use, since the publishers use it for typesetting music for schools.

The computer has proven to be a very effective enabling agent for people with special educational needs. The ability to control the computer by using a variety of different input devices has liberated many people from the physical constraints of paper and pen, or typewriter. It has opened up communication and access to information that was previously beyond their capabilities.

Any discussion concerning educational software must also consider input devices which enable easier interaction with the software. Three input devices which have really proved their worth in an educational context over the years are the Concept Keyboard, the Touchtech 501 touchscreen and the AMX mouse.

The Concept Keyboard sold by AB European Marketing, overcomes most of the difficulties of the Qwerty typewriter keyboard. It uses A4 or A3-sized touch-sensitive pads, and paper overlays which can be individually designed to suit particular programs – the overlay could have letters, whole words or even pictures on it.

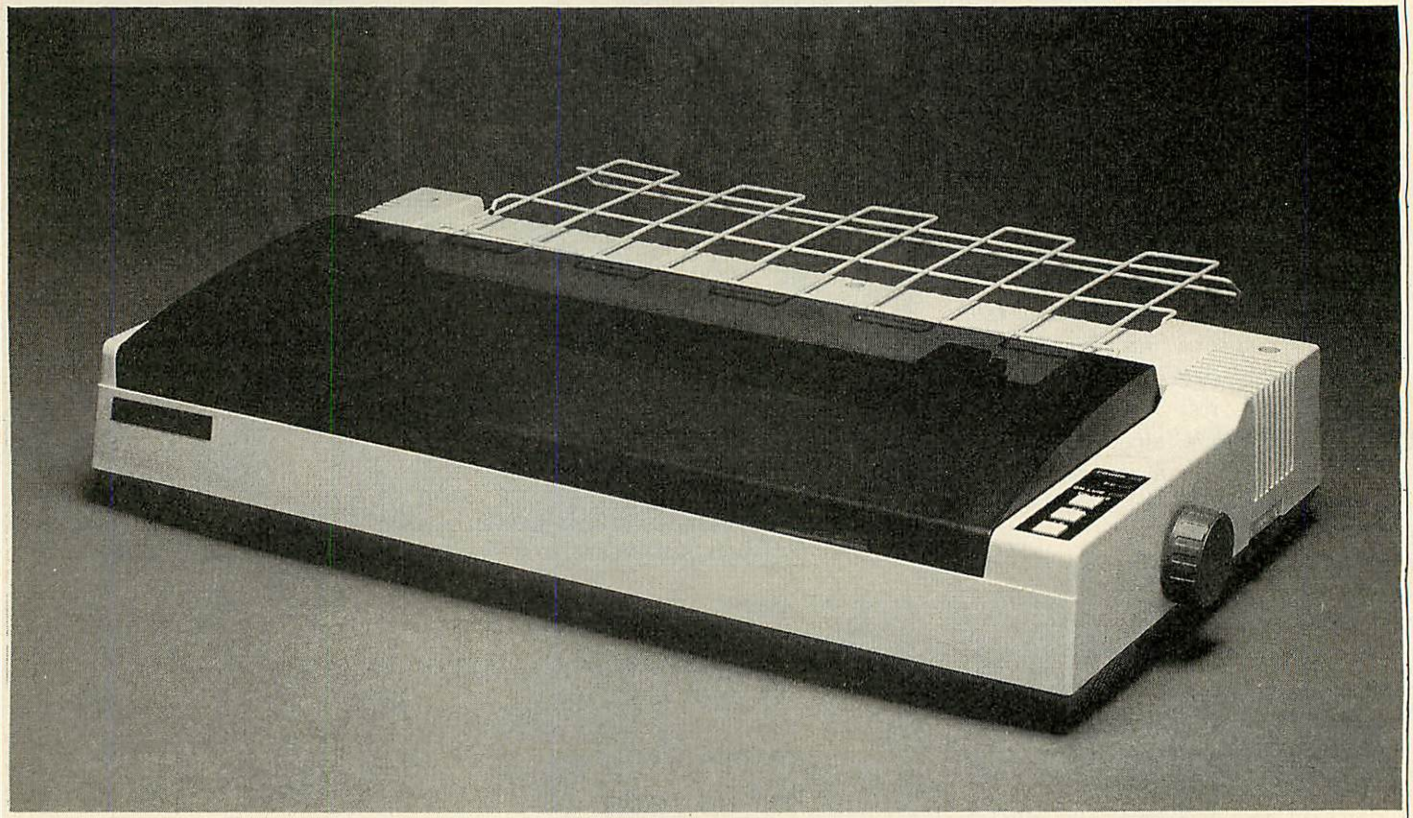
Increasingly, software is being produced with an option for using a Concept Keyboard. With good software, children using the keyboard are freed from the constraints of the Qwerty layout and can explore a wide range of concepts important to their reading and language development.

The Touchtech 501 fits over the front of an M series metal-cased Microvitec Cub monitor, and with the right software eliminates the need to use the keyboard at all. Children simply touch the screen. Young ones love it because it is a 'friendly' and natural means of interacting with the computer. The Touchtech can open up the world of computing and communication to children who lack fine motor co-ordination.

Ever since the AMX mouse arrived, there has been a revolution in both presentation and interaction in software for the BBC micro. Generally refered to as a 'Wimp environment' (standing for Window, Icon, Menu, Pointer), it has benefitted older pupils, particularly those with motor-skill problems. Pupils fare

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The Sakata 5500 printer is Epson FX-compatible. It offers the following features: Pica, Elite and NLQ fonts plus a downloadable character set; a 3k printer buffer; friction and tractor feed for paper up to 16 inches wide; graphics modes compatible with *Acorn User*'s *UserDump* ROM; super and subscripts; bold and italics.

The printer is both fast and quiet, printing at a rate of 180 cps (draft mode) or 40 cps (NLQ mode) with a noise level of less than 55 decibels.

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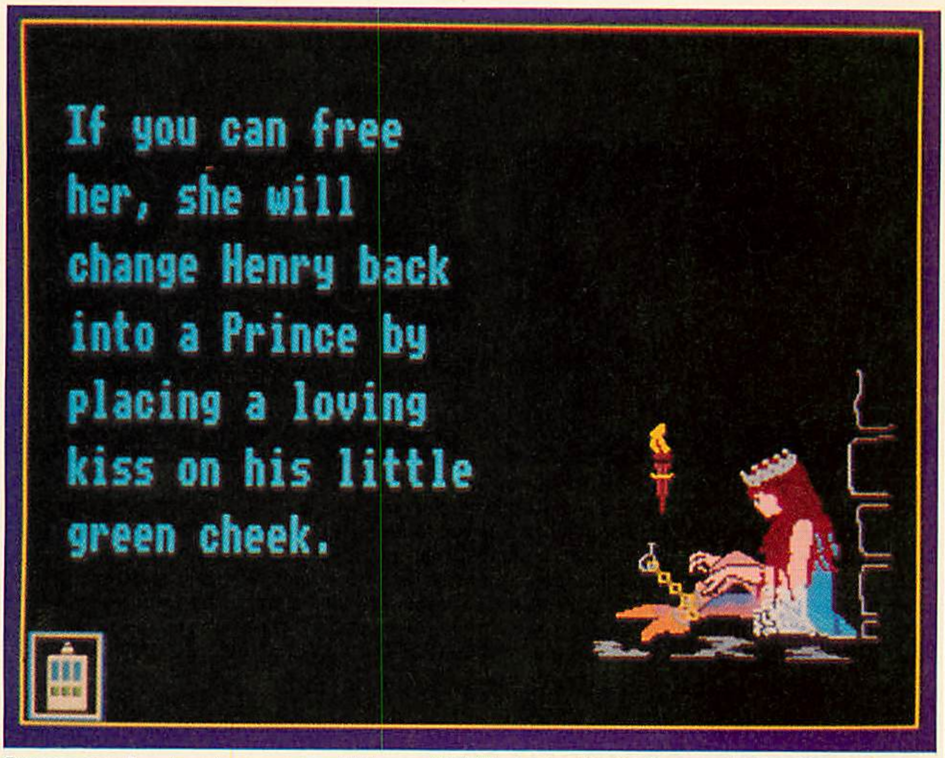
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much better with the 'chunky' feel of the mouse than with some of the precision devices that are available.

A wide range of very good software for children with special needs is available. Brilliant Computing produces a graded range of Touchtech software to complement that produced for the various switch units which the company itself markets. Arrow Marketing publishes two touchscreen packs: *Nursery Pack* and *Primary Pack,* both for the Touchtech and Concept Keyboard. The Research Centre for Education of the Visually Handicapped (RCEVH) has produced and refined 17 excellent little programs for individuals who generally have multiple handicaps, and who represent a wide range of learning difficulties. The Micromate range provides children with a novel approach, which many will find stimulating and enjoyable.

Both MESU and the various SEMERCs have published a variety of materials which are either available as Blue File (copy free) usually through teachers centres, or maybe purchased ready-prepared at a nominal price. Most of this software utilises the Concept Keyboard, and comes complete with both A3 and A4 overlays. Some titles of particular note are *Click, Animal Pack, Prompt-3, Touch Explorer, Window, List Explorer* and *Turtle Concepts.*

Some of the best educational utilities for the BBC micro include *Snatch* from 4Mation. This is a must for every classroom. It allows you to grab screens during the running of many programs, and then save them to disc or print them out immediately in black and white or colour, full size or half-size, and even with only a portion of the screen printed. This area can then be enlarged to make a character from your favourite program larger then life! *Snatch* is supplied on disc, and loads into sideways RAM – so is only suitable for Masters, Compacts and those BBC B's that sport a sideways RAM upgrade like *Acorn User*'s own *UserRAM.* ESM's *Screenprint* is very similar, but is resident on a chip inside your machine. It has fewer facilities than *Snatch,* but it still prints the screen in colour or black and white. *Screenprint* works on all BBC machines – and with the Epson or Star dot-matrix colour printers. *Snatch* only prints in colour with the pricey Integrex Colourjet. Certainly one or other of these utilities is quite indispensable for capturing work as it is




**Droom: an adventure for younger children which illustrates the Arc's potential in education**

being done, making instruction cards for programs, creating display materials and work cards.

*Mastercopy* from MB Software is another quite indispensable utility for the person in charge of computers in a school, and even for computer users at home who have several different disc drives and filing systems. This package simplifies the often complex procedure of copying files from one disc to another and between systems. The true value becomes apparent when it is used to copy from ADFS to DFS, or from the Econet. Working 'intelligently', it asks for the source and destination drives, and the filing system on each, then it offers each file for verification. Once chosen, the files are copied automatically, directories being created as necessary on ADFS systems.

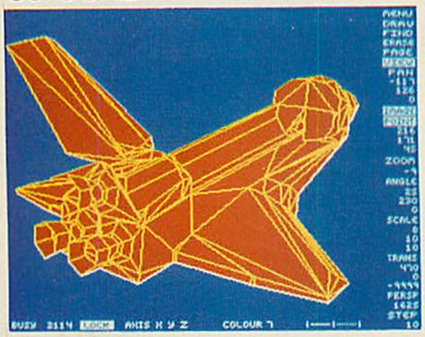
The range and quality of educational software for the BBC micro is unparalleled. While we've selected the 'best', the choice is of course a personal one – and there are bound to be packages we've missed. If you've any particular favourites, let us know in a letter to *BBC Acorn User.* For use at home, most of these packages are suitable, and can be put to good effect by most interested parents. But the watchword is always co-operation. It really is best to discuss what you want to use with teachers at school, particularly if they want to use similar software too.

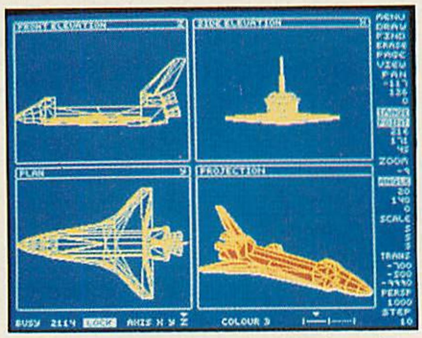
*Northern Micromedia, Resources Centre, Coachlane Campus, Newcastle Upon Tyne NE7 7XA. Tressell Publications, Unit 3, 22 Campbell Road, Brighton BN1 7BZ. Sherston Software, Swan Barton, Sherston, Malmesbury, Wiltshire SN16 0LH. 4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ. The Smile centre, Middle Row School, Kensal Road, London W10 5DB. Learning and Training Systems, Haydon House, Alcester Road, Studley B80 7AP. NELB, Antrim Resources Centre, Railway Street, County Antrim BT41 4AE. Fernleaf, 31 Old Road West, Gravesend DA11 0LH. Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA. Logotron Ltd, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. ITV Association, 6 Paul Street, London EC2. AVP, School Hill Centre, Chepstow, Gwent NP6 5PH. Newman Software, Newman College, Bartley Green, Birmingham. ESM, Duke Street, Wisbech, Cambridgeshire. AVP, School Hill Centre, Chepstow. MB Software, 4 Arden Close, Hadrian Park, Wallsend. Data Design, 3 Botham Hall Road, Longwood, Huddersfield. BBC Soft, 80 Wood Lane, London. Resource, Exeter Road, off Coventry Grove, Doncaster DN2 4PY. RBRC Software, 32 Worple Road, Wimbledon, London. Microvetec Ltd, Futures Way, Bolling Road, Bradford BD4 7TU. AB European Marketing, Wharfdale Road, Pentwyn, Cardiff CF2 7HB. AMS Advanced Memory Systems, 166-170 Wilderspool Causeway, Warrington WA4 6OA.*

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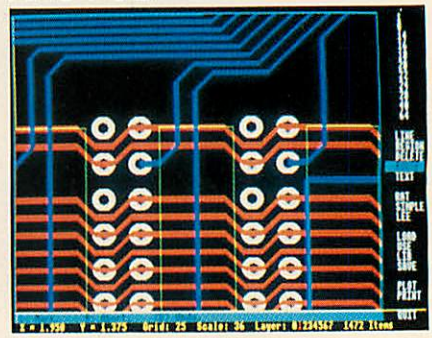
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# YELLOW PAGES

## COMPATIBILITY

| Program | Page | BBC B | B+/128 | Master 128 | Master Compact | Electron | Arc | 6502SP/ Turbo | ADFS | Econet | Shadow RAM | Monthly Disc |
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*Note*
1. Requires Basic 2.
2. Will work, but screen background will be different.

**See Hints & Tips, page 41**

### Listing 1. Electron function keys

```
   10 REM Elk function k
ey enhancer
   20 REM by Brian Ross
   30 REM for Elk only
   40 REM (c) BAU May 19
89
   50 :
   60 code=&900
   70 osbyte=&FFF4
   80 insv=&22A
   90 keystatus=&25A
  100 :
  110 FOR pass=0 TO 2 ST
EP 2
  120 P%=code
  130 [OPT pass
  140 :
  150 .init
  160 LDA insv
  170 STA oldinsv
  180 LDA insv+1
  190 STA oldinsv+1
  200 LDA #inter MOD 256
  210 STA insv
  220 LDA #inter DIV 256
  230 STA insv+1
  240 RTS
  250 :
  260 .inter
  270 CPX #0
  280 BEQ keybuffer
  290 JMP (oldinsv)
  300 .keybuffer
  310 CMP #0
  320 BNE char_n_0
  330 PHA
  340 TXA
  350 PHA
  360 LDA #&81
  370 LDX #&B8
  380 LDY #&FF
  390 JSR osbyte
  400 PLA
  410 TAX
  420 PLA
  430 CPY #&FF
  440 BEQ key_0
  450 JMP (oldinsv)
  460 .key_0
  470 LDA #&30
  480 .char_n_0
  490 CMP #&30
  500 BCS char_ge_30
  510 JMP (oldinsv)
  520 .char_ge_30
  530 CMP #&3A
  540 BCC char_l_3A
  550 JMP (oldinsv)
  560 .char_l_3A
  570 BIT keystatus
  580 BPL noctrl
  590 BVC noshft
  600 JMP (oldinsv)
  610 .noshft
  620 CLC
  630 ADC #&80
  640 .noctrl
  650 JMP (oldinsv)
  660 :
  670 .oldinsv
  680 EQUW 0
  690 ]
  700 NEXT
```

### Listing 2. Mode 7 graphics commands

```
   10 REM Mode 7 plottin
g
   20 REM by Andrew Pisk
ozub
   30 REM for B(with Bas
ic2)/B+/E/M/C
   40 REM (c) BAU May 19
89
   50 :
   60 MODE 7
   70 HIMEM=&7700
   80 test%=&7700
   90 xlow=&320
  100 xhigh=&321
  110 ylow=&322
  120 yhigh=&323
  130 FOR Y%=0 TO 75
  140 test%?Y%=2-Y% MOD
3+4*(24-Y%DIV3)
  150 NEXT
  160 FOR pass=0 TO 3 ST
EP 3
  170 P%=test%+76
  180 [OPT pass
  190 BCC start
  200 .return
  210 RTS
  220 .start
  230 LDX &355
  240 CPX #7
  250 BNE return
  260 CMP #69
  270 BEQ plot
  280 CMP #4
  290 BNE notmv
  300 JMP move
  310 .notmv
  320 CMP #5
  330 BNE return
  340 JMP draw
  350 .plot
  360 LDA xlow
  370 STA xlow1
  380 CLC
  390 ADC &30C
  400 STA xlow
  410 LDA xhigh
  420 STA xhigh1
  430 ADC &30D
  440 STA xhigh
  450 LDA ylow
  460 STA ylow1
  470 CLC
  480 ADC &30E
  490 STA ylow
  500 LDA yhigh
  510 STA yhigh1
  520 ADC &30F
  530 STA yhigh
  540 LDX md
  550 LDA and,X
  560 STA and1
  570 LDA or,X
  580 STA or1
  590 LDA eor,X
  600 STA eor1
  610 LDA xhigh
  620 ORA yhigh
  630 BNE return
  640 LDX xlow
  650 CPX #74
  660 BCS return
  670 LDY ylow
  680 CPY #76
  690 BCS return
  700 LDA &70
  710 PHA
  720 LDA &71
  730 PHA
  740 JSR address
```

**Continued ▶**

**◀ Mode 7 Graphics, continued**

```
750 LDA S%,X
760 STA notmsk
770 STA cl
780 EOR #95
790 STA mask
800 LDA &359
810 BNE len
820 LDA #0
830 STA cl
840 .len
850 LDA (&70),Y
860 LDX and1
870 AND p,X
880 LDX or1
890 ORA p,X
900 LDX eor1
910 EOR p,X
920 AND #255 NOT 160
930 ORA #160
940 STA (&70),Y
950 PLA
960 STA &71
970 PLA
980 STA &70
990 RTS
1000 .address
1010 LDA test%,Y
1020 AND #255 AND NOT 3
1030 ASL A
1040 STA &70
1050 STA ta
1060 LDA #0
1070 ROL A
1080 STA &71
1090 STA tb
1100 ASL ta
1110 ROL tb
1120 ASL ta
1130 ROL tb
1140 LDA &70
1150 CLC
1160 ADC ta
1170 STA &70
1180 LDA &71
1190 ADC tb
1200 ADC #&7C
1210 STA &71
1220 TXA
1230 LSR A
1240 PHP
1250 LDA test%,Y
1260 AND #3
1270 ASL A
1280 PLP
1290 ADC #0
1300 PHA
1310 TXA
1320 LSR A
1330 CLC
1340 ADC #3
1350 TAY
1360 PLA
1370 TAX
1380 RTS
1390 .move
1400 LDA xlow
1410 STA xlow1
1420 STA &310
1430 LDA xhigh
1440 STA &311
1450 STA xhigh1
1460 LDA ylow
1470 STA &312
1480 STA ylow1
1490 LDA yhigh
1500 STA &313
1510 STA yhigh1
1520 RTS
1530 .draw
1540 LDA xlow
1550 STA xlow2
1560 LDA xhigh
1570 STA xhigh2
1580 LDA ylow
1590 STA ylow2
1600 LDA yhigh
1610 STA yhigh2
1620 LDX #0
1630 JSR sub1
1640 INX
1650 JSR sub1
1660 LDA ydhigh
1670 CMP xdhigh
1680 BCC false
1690 BNE true
1700 LDA ydlow
1710 CMP xdlow
1720 BCC false
1730 .true
1740 LDX xdlow
1750 LDY ydlow
1760 STX ydlow
1770 STY xdlow
1780 LDX xdhigh
1790 LDY ydhigh
1800 STX ydhigh
1810 STY xdhigh
1820 LDA #255
1830 BMI notz
1840 .false
1850 LDA #0
1860 .notz
1870 STA flow
1880 LDA xdlow
1890 STA hrlow
1900 LDA xdhigh
1910 STA hrhigh
1920 ASL ydlow
1930 ROL ydhigh
1940 LDA ydlow
1950 SEC
1960 SBC xdlow
1970 STA tlow
1980 LDA ydhigh
1990 SBC xdhigh
2000 STA thigh
2010 ASL xdlow
2020 ROL xdhigh
2030 .lr
2040 JSR plot1
2050 LDA thigh
2060 BMI lab10
2070 LDA tlow
2080 SEC
2090 SBC xdlow
2100 STA tlow
2110 LDA thigh
2120 SBC xdhigh
2130 STA thigh
2140 LDA flow
2150 JSR sub3
2160 .lab10
2170 LDA tlow
2180 CLC
2190 ADC ydlow
2200 STA tlow
2210 LDA thigh
2220 ADC ydhigh
2230 LDA flow
2240 EOR #255
2250 JSR sub3
2260 LDA #255
2270 DEC hrlow
2280 CMP hrlow
2290 BNE lr
2300 DEC hrhigh
2310 CMP hrhigh
2320 BNE lr
2330 LDA xlow2
2340 STA xlow1
2350 STA &310
2360 LDA xhigh2
2370 STA xhigh1
2380 STA &311
2390 LDA ylow2
2400 STA ylow1
2410 STA &312
2420 LDA yhigh2
2430 STA yhigh1
2440 STA &313
2450 RTS
2460 .sub1
2470 LDA xlow2,X
2480 SEC
2490 SBC xlow1,X
2500 STA xdlow,X
2510 LDA xhigh2,X
2520 SBC xhigh1,X
2530 STA xdhigh,X
2540 BPL m1
2550 LDA #255
2560 BMI m2
2570 .m1
2580 LDA #1
2590 .m2
2600 STA xs,X
2610 BPL m3
2620 STA xshigh,X
2630 EOR xdlow,X
2640 CLC
2650 ADC #1
2660 STA xdlow,X
2670 LDA xdhigh,X
2680 EOR #255
2690 ADC #0
2700 STA xdhigh,X
2710 RTS
2720 .m3
2730 LDA #0
2740 STA xshigh,X
2750 RTS
2760 .sub3
2770 BMI n9
2780 LDA ylow1
2790 CLC
2800 ADC ys
2810 STA ylow1
2820 LDA yhigh1
2830 ADC yshigh
2840 STA yhigh1
2850 RTS
2860 .n9
2870 LDA xlow1
2880 CLC
2890 ADC xs
2900 STA xlow1
2910 LDA xhigh1
2920 ADC xshigh
2930 STA xhigh1
2940 RTS
2950 .plot1
2960 LDA #25
2970 JSR oswrch
2980 LDA #69
2990 JSR oswrch
3000 LDA xlow1
3010 JSR oswrch
3020 LDA xhigh1
3030 JSR oswrch
3040 LDA ylow1
3050 JSR oswrch
3060 LDA yhigh1
3070 JSR oswrch
3080 RTS
3090 .xlow1  EQUB 0
3100 .ylow1  EQUB 0
3110 .xhigh1 EQUB 0
3120 .yhigh1 EQUB 0
3130 .xdlow  EQUB 0
3140 .ydlow  EQUB 0
3150 .xdhigh EQUB 0
3160 .ydhigh EQUB 0
3170 .tlow   EQUB 0
3180 .thigh  EQUB 0
3190 .xs     EQUB 0
3200 .ys     EQUB 0
3210 .xshigh EQUB 0
3220 .yshigh EQUB 0
3230 .xlow2  EQUB 0
3240 .ylow2  EQUB 0
3250 .xhigh2 EQUB 0
3260 .yhigh2 EQUB 0
3270 .hrlow  EQUB 0
3280 .hrhigh EQUB 0
3290 .flow   EQUB 0
3300 .ta     EQUB 0
3310 .tb     EQUB 0
3320 .S%     EQUD &0804
0201
 3330        EQUD &0000
4010
 3340 .and   EQUB 3
 3350        EQUW &0200
 3360        EQUW &0000
 3370 .or    EQUB 2
 3380        EQUW &0102
 3390        EQUW &0101
 3400 .eor   EQUB 1
 3410        EQUW &0101
 3420        EQUW &0402
 3430 .md    EQUB 4
 3440 .and1  EQUB 0
 3450 .or1   EQUB 0
 3460 .eor1  EQUB 0
 3470 .p     EQUB 255
 3480        EQUB 0
 3490 .cl    EQUB 1
 3500 .mask  EQUB 0
 3510 .notmsk EQUB 0
 3520 .vdunew
 3530 PHA
 3540 TXA
 3550 PHA
 3560 TYA
 3570 PHA
 3580 TSX
 3590 LDA &103,X
 3600 BIT flag
 3610 BMI minus
 3620 DEC flag
 3630 PHA
 3640 TAX
 3650 CPX #32
 3660 BCC minus1
 3670 LDX #32
 3680 .minus1
 3690 LDA xbytes,X
 3700 STA left
 3710 LDA #0
 3720 STA index
 3730 PLA
 3740 .minus
 3750 LDX index
 3760 STA vdu,X
 3770 INX
 3780 STX index
 3790 CPX left
 3800 BCC finish
 3810 INC flag
 3820 LDX #0
 3830 LDA &355
 3840 CMP #7
 3850 BNE minus2
 3860 LDA vdu
 3870 CMP #18
 3880 BNE k1
 3890 LDA vdu+1
 3900 STA md
 3910 LDA vdu+2
 3920 STA &359
 3930 JMP finish
 3940 .k1
 3950 CMP #29
 3960 BNE minus2
 3970 LDX #0
 3980 .k2
 3990 LDA vdu+1,X
 4000 STA &30C,X
 4010 INX
 4020 CPX #4
 4030 BNE k2
 4040 JMP finish
 4050 .minus2
 4060 LDA vdu,X
 4070 JSR oswrch
 4080 INX
 4090 CPX left
 4100 BNE minus2
 4110 .finish
 4120 PLA
 4130 TAY
 4140 PLA
 4150 TAX
 4160 PLA
```

Continued ▶

### ◀ Mode 7 Graphics, continued

```
4170 RTS
4180 .govdu
4190 LDA #vdunew MOD256
4200 STA &20E
4210 LDA #vdunew DIV256
4220 STA &20F
4230 RTS
4240 .left   EQUB 0
4250 .flag   EQUB 0
4260 .index  EQUB 0
4270 .vdu    EQUS STRIN
G$(10," ")
4280 .xbytes EQUS STRIN
G$(33," ")
4290 .wrchv  EQUD !&20E
4300 .oswrch
4310 JMP (wrchv)
4320 .oswd2
4330 CMP #9
4340 BEQ d1
4350 JMP osword
4360 .d1
4370 LDA &355
4380 CMP #7
4390 BEQ ok
4400 LDA #9
4410 JMP osword
4420 .ok
4430 LDA &7E
4440 PHA
4450 LDA &7F
4460 PHA
4470 LDA &70
4480 PHA
4490 LDA &71
4500 PHA
4510 STX &7E
4520 STY &7F
4530 LDY #0
4540 LDA (&7E),Y
4550 PHA
4560 CLC
4570 ADC &30C
4580 STA (&7E),Y
4590 INY
4600 LDA (&7E),Y
4610 PHA
4620 ADC &30D
4630 STA (&7E),Y
4640 INY
4650 LDA (&7E),Y
4660 PHA
4670 ADC &30E
4680 STA (&7E),Y
4690 INY
4700 LDA (&7E),Y
4710 PHA
4720 ADC &30F
4730 STA (&7E),Y
4740 LDY #1
4750 LDA (&7E),Y
4760 LDY #3
4770 ORA (&7E),Y
4780 BNE out
4790 DEY
4800 LDA (&7E),Y
4810 CMP #76
4820 BCS out
4830 LDY #0
4840 LDA (&7E),Y
4850 CMP #74
4860 BCC in
4870 .out
4880 LDA #255
4890 LDY #4
4900 STA (&7E),Y
4910 DEY
4920 .we
4930 PLA
4940 STA (&7E),Y
4950 DEY
4960 BPL we
4970 PLA
4980 STA &71
4990 PLA
5000 STA &70
5010 PLA
5020 STA &7F
5030 PLA
5040 STA &7E
5050 RTS
5060 .in
5070 LDY #0
5080 LDA (&7E),Y
5090 TAX
5100 LDY #2
5110 LDA (&7E),Y
5120 TAY
5130 JSR address
5140 LDA (&70),Y
5150 AND S%,X
5160 BEQ out+2
5170 LDA #1
5180 JMP out+2
5190 .osword
5200 JMP (wordv)
5210 .wordv  EQUD !&20C
5220 .goword
5230 LDA #oswd2 MOD 256
5240 STA &20C
5250 LDA #oswd2 DIV 256
5260 STA &20D
5270 RTS
5280 .go
5290 JSR goword
5300 JSR govdu
5310 LDA #(test%+76) MO
D 256
5320 STA &226
5330 LDA #(test%+76) DI
V 256
5340 STA &227
5350 RTS
5360 ]
5370 NEXT
5380 FOR A%=0 TO 32
5390 READ B%
5400 xbytes?A%=B%
5410 NEXT
5420 DATA1,2,1,1,1,1,1,
1,1,1
5430 DATA1,1,1,1,1,1,1,
2,3,6
5440 DATA1,1,2,10,9,6,1
,1,5,5,1,3,1
5450 A$="*SAVE GRMODE7
"+STR$~test%+" "+STR$~P%
+" "+STR$~go+" "+STR$~te
st%
5460 PRINT"Press S to s
ave code"
5470 PRINT"Press I to i
nstall and demonstrate"
5480 REPEAT
5490 G%=GET AND &DF
5500 UNTIL G%=ASC"S" OR
G%=ASC"I"
5510 IF G%=ASC"S" GOTO
5540
5520 PROCdemo
5530 END
5540 PRINT A$
5550 OSCLI A$
5560 PRINT "See demo an
yway? Y/N"
5570 REPEAT
5580 G%=GET AND &DF
5590 UNTIL G%=ASC"Y" OR
G%=ASC"N"
5600 IF G%=ASC"Y" PROCd
emo
5610 END
5620 :
5630 DEFPROCdemo
5640 CLS
5650 CALL go
5660 FOR I%=0 TO 23
5670 PRINT CHR$(145+(I%
MOD 7))
5680 NEXT
5690 VDU 145
5700 FOR I%=0 TO 75 STE
P 5
5710 MOVE 37,35
5720 DRAW I%,72
5730 MOVE 37,35
5740 DRAW I%,0
5750 NEXT
```

### Listing 3. User Defined characters

```
10 REM UDC's in SRAM
20 REM by Brian Ross
30 REM for B(with Bas
ic2)/B+/E/M/C
40 REM (c) BAU May 19
89
50 :
60 MODE 6
70 VDU 28,0,24,39,20
80 :
90 code%=&6000
100 oswpos=&D80
110 osasci=&FFE3
120 osword=&FFF1
130 :
140 PROCass
150 PROCcheck
160 OSCLI "SAVE udc 60
00 "+STR$~O%+" 8000 8000
"
170 END
180 :
190 DEF PROCass
200 FOR X%=4 TO 6 STEP
2
210 O%=code%
220 P%=&8000
230 diff%=P%-O%
240 [OPT X%
250 .romstrt
260 EQUB 0
270 EQUB 0
280 EQUB 0
290 JMP service
300 EQUB &82
310 EQUB (copyr-romstr
t)
320 EQUB 0
330 .title
340 EQUB 13
350 EQUS "S-RAM user d
efined characters"
360 EQUB 13
370 .copyr
380 EQUB 0
390 EQUS "(C) 1988 Bri
an Ross"
400 EQUB 0
410 :
420 .service
430 CMP #9
440 BEQ help
450 CMP #2
460 BEQ init
470 CMP #8
480 BEQ uosw
490 RTS
500 :
510 .uosw
520 PHA
530 TYA
540 PHA
550 TXA
560 PHA
570 LDA &EF
580 CMP #29
590 BNE oswover
600 LDA #10
610 .uoswfin
620 LDX &F0
630 LDY &F1
640 JSR oldosw
650 PLA
660 TAX
670 PLA
680 TAY
690 PLA
700 LDA #0
710 RTS
720 .oswover
730 CMP #30
740 BNE uoswover2
750 LDA #0
760 JMP uoswfin
770 .uoswover2
780 PLA
790 TAX
800 PLA
810 TAY
820 PLA
830 RTS
840 :
850 .help
860 TYA
870 PHA
880 TXA
890 PHA
900 LDA (&F2),Y
910 CMP #13
920 BNE helpout
930 LDY #0
940 .helploop
950 LDA title,Y
960 BEQ helpout
970 JSR osasci
980 INY
990 JMP helploop
1000 .helpout
1010 PLA
1020 TAX
1030 PLA
1040 TAY
1050 LDA #9
1060 RTS
1070 :
1080 .init
1090 TYA
1100 PHA
1110 TXA
1120 PHA
1130 STX trom
1140 JSR udc
1150 JSR setvectors
1160 PLA
1170 TAX
1180 PLA
1190 TAY
1200 LDA #2
1210 RTS
1220 :
1230 .udc
1240 LDA &28D
1250 BEQ udcover
1260 LDA #0
1270 STA &F6
1280 LDA #&B9
1290 STA &F7
1300 LDA #&20
1310 STA temp
1320 .getoschl
1330 STA pblocka
1340 LDY #pblocka DIV 2
56
1350 LDX #pblocka MOD 2
56
1360 LDA #&A
1370 JSR osword
1380 JSR movepba
1390 INC temp
1400 LDA temp
1410 CMP #&80
1420 BNE getoschl
```

Continued ▶

◀ **User Defined characters, continued**

```
1430 .udcover
1440 LDA #&FF
1450 STA &367
1460 LDA #&B9
1470 STA &368
1480 LDA #&BA
1490 STA &369
1500 LDA #&BB
1510 STA &36A
1520 LDA #&BC
1530 STA &36B
1540 LDA #&BD
1550 STA &36C
1560 LDA #&BE
1570 STA &36D
1580 LDA #&BF
1590 STA &36E
1600 RTS
1610 :
1620 .movepba
1630 LDY #0
1640 .mpbal
1650 LDA pblocka+1,Y
1660 STA (&F6),Y
1670 INY
1680 CPY #9
1690 BNE mpbal
1700 CLC
1710 LDA &F6
1720 ADC #8
1730 STA &F6
1740 LDA &F7
1750 ADC #0
1760 STA &F7
1770 RTS
1780 :
1790 .setvectors
1800 SEI
1810 LDA &20E
1820 STA oldoswrch
1830 LDA &20F
1840 STA oldoswrch+1
1850 LDA #newoswrch MOD
256
1860 STA &D9F+21
1870 LDA #newoswrch DIV
256
1880 STA &DA0+21
1890 LDA trom
1900 STA &DA1+21
1910 LDA #(&FF00+21) MO
D 256
1920 STA &20E
1930 LDA #(&FF00+21) DI
V 256
1940 STA &20F
1950 :
1960 LDA &20A
1970 STA oldbytev
1980 LDA &20B
1990 STA oldbytev+1
2000 LDA #newbyte MOD 2
56
2010 STA &D9F+15
2020 LDA #newbyte DIV 2
56
2030 STA &DA0+15
2040 LDA trom
2050 STA &DA1+15
2060 LDA #(&FF00+15) MO
D 256
2070 STA &20A
2080 LDA #(&FF09+15) DI
V 256
2090 STA &20B
2100 :
2110 LDY #0
2120 .noswl
2130 LDA newoswstart,Y
2140 STA oswpos,Y
2150 INY
2160 CPY #(newoswend-ne
woswstart+1)
2170 BNE noswl
2180 LDA &20C
2190 STA oldosw+1
2200 LDA &20D
2210 STA oldosw+2
2220 LDA #newosw MOD 25
6
2230 STA &20C
2240 LDA #newosw DIV 25
6
2250 STA &20D
2260 RTS
2270 :
2280 .newoswstart
2290 ]
2300 P%=oswpos
2310 [OPT X%
2320 .newosw
2330 CMP #0
2340 BEQ newoswover2
2350 CMP #&A
2360 BEQ newoswover
2370 .oldosw
2380 JMP &0000
2390 .newoswover
2400 LDA #29
2410 BNE oldosw
2420 .newoswover2
2430 LDA #30
2440 BNE oldosw
2450 ]
2460 P%=O%+diff%
2470 [OPT X%
2480 .newoswend
2490 :
2500 .newoswrch
2510 JMP (oldoswrch)
2520 .oldoswrch
2530 EQUW 0
2540 :
2550 .newbyte
2560 JMP (oldbytev)
2570 .oldbytev
2580 EQUW 0
2590 :
2600 .temp
2610 EQUB 0
2620 :
2630 .pblocka
2640 EQUD 0
2650 EQUD 0
2660 EQUB 0
2670 :
2680 .trom
2690 EQUB 0
2700 ]
2710 NEXT
2720 ENDPROC
2730 :
2740 DEF PROCcheck
2750 T%=0
2760 FOR X%=code% TO O%
2770 T%=T%+?X%
2780 NEXT
2790 IF T%<>&BAF5 THEN
VDU 7:PRINT "Checksum er
ror - Please check listi
ng":END
2800 ENDPROC
```

**Listing 4. Line Editor**

```
10 REM Line Editor
20 REM for BBC B/B+/E
/M/C
30 REM by Barry Ambro
se
40 REM (c) BAU May 19
89
50 :
60 MODE 7
70 PROCrelocate
80 PROCexec
90 PROCequates
100 PROCassem
110 PROCsave
120 END
130 :
140 DEF PROCrelocate
150 IF Z%=999 THEN Z%=
0:ENDPROC
160 Z%=999
170 PRINT "Relocating"
180 PRINT "**********"
190 FOR I%=TOP TO PAGE
STEP -1
200 I%?&400=?I%
210 NEXT I%
220 Y%=PAGE
230 PAGE=PAGE+&400
240 *KEY 0 OLD|MRUN|M
250 *FX 138 0 128
260 END
270 :
280 DEF PROCexec
290 PRINT "Creating EX
EC file RETLINE"
300 PRINT "***********
***************"
310 VDU 21
320 *SPOOL retline
330 PRINT "*KEY 10 ?PA
.=&AD:PA.=PA.+&400:CALL
PA.-&400|m"
340 PRINT "*KEY 9 A%=1
80:X%=(PAGE+&400) DIV &1
00:CALL &FFF4 |M"
350 PRINT "PA.=PA.+&40
0"
360 PRINT "NEW"
370 PRINT "*/retcode"
380 PRINT "CLS"
390 PRINT "REM retriev
e facility installed"
400 *SPOOL
410 VDU 6
420 ENDPROC
430 :
440 DEF PROCequates
450 wordv=&20C
460 linezp=&E8
470 beep=7
480 oswrch=&FFEE
490 osrdch=&FFE0
500 osasci=&FFE3
510 mode=&355
520 left=8
530 right=9
540 CR=13
550 ctrlu=21
560 space=32
570 delete=127
580 insert=&91
590 retlast=&90
600 ENDPROC
610 :
620 DEF PROCassem
630 PRINT "Assembling"
640 PRINT "**********"
650 FOR pass=0 TO 2 ST
EP 2
660 P%=Y%
670 [OPT pass
680 .readtrap
690 LDA wordv
700 STA oldv
710 LDA wordv+1
720 STA oldv+1
730 SEI
740 LDA #read MOD 256
750 STA wordv
760 LDA #read DIV 256
770 STA wordv+1
780 LDY #0
790 TYA
800 .blank
810 STA store,Y
820 INY
830 BNE blank
840 STA startf
850 STA insertf
860 CLI
870 RTS
880 :
890 .read
900 CMP #0
910 BEQ readline
920 JMP (oldv)
930 .readline
940 STX &F0
950 STY &F1
960 LDY #4
970 .xycopy
980 LDA (&F0),Y
990 STA xytable,Y
1000 DEY
1010 BPL xycopy
1020 LDA xytable
1030 STA linezp
1040 LDA xytable+1
1050 STA linezp+1
1060 LDA #0
1070 STA len
1080 STA index
1090 STA &269
1100 STA startstore
1110 JMP readloop3
1120 .readloop1
1130 LDA #beep
1140 .readloop2
1150 JSR oswrch
1160 .readloop3
1170 JSR osrdch
1180 BCC ntest1
1190 SEC
1200 LDY len
1210 RTS
1220 .ntest1
1230 LDX &26A
1240 BNE readloop2
1250 CMP #ctrlu
1260 BNE ntest2
1270 LDY len
1280 BEQ readloop3
1290 LDY index
1300 LDA #right
1310 .gotoend
1320 CPY len
1330 BCS dline
1340 JSR oswrch
1350 INY
1360 JMP gotoend
1370 .dline
1380 LDA #delete
1390 .kill
1400 JSR oswrch
1410 DEY
1420 BNE kill
1430 TYA
1440 STA len
1450 STA index
1460 JMP readloop3
1470 .ntest2
1480 CMP #delete
1490 BNE ntest3
1500 LDY index
1510 BEQ readloop3
1520 LDA #delete
1530 JSR oswrch
1540 CPY len
1550 BEQ skipcopy
1560 .over
1570 LDA (linezp),Y
1580 JSR oswrch
1590 DEY
1600 STA (linezp),Y
1610 INY
1620 INY
1630 CPY len
1640 BCC over
1650 LDA #space
1660 JSR oswrch
```

Continued ▶

# ARC AGORA

◀ **Line Editor, continued**

```
1670 LDA #left
1680 JSR oswrch
1690 .back
1700 JSR oswrch
1710 DEY
1720 CPY index
1730 BNE back
1740 .skipcopy
1750 DEC len
1760 DEC index
1770 JMP readloop3
1780 :
1790 .ntest3
1800 CMP #left
1810 BNE ntest4
1820 LDY index
1830 BEQ hoploop3
1840 JSR oswrch
1850 DEC index
1860 JMP readloop3
1870 :
1880 .ntest4
1890 CMP #right
1900 BNE ntest5
1910 LDY index
1920 CPY len
1930 BEQ hoploop3
1940 JSR oswrch
1950 INC index
1960 JMP readloop3
1970 :
1980 .ntest5
1990 CMP #insert
2000 BNE ntest6
2010 LDA insertf
2020 EOR #255
2030 STA insertf
2040 BEQ off
2050 LDY #8
2060 BNE setR10
2070 .off
2080 LDY mode
2090 .setR10
2100 LDA #23
2110 JSR oswrch
2120 LDA #0
2130 JSR oswrch
2140 LDA #10
2150 JSR oswrch
2160 LDA cursor,Y
2170 JSR oswrch
2180 LDY #6
2190 LDA #0
2200 .pad
2210 JSR oswrch
2220 DEY
2230 BNE pad
2240 .hoploop3
2250 JMP readloop3
2260 :
2270 .cursor
2280 ]:!P%=&67676767
2290 P%!4=&72676767
2300 P%?8=&61:P%=P%+9
2310 [ OPT pass
2320 :
2330 .ntest6
2340 CMP #retlast
2350 BNE ntest7
2360 LDA startf
2370 BEQ hoploop3
2380 LDY len
2390 BEQ nodelete
2400 LDA #right
2410 LDY index
2420 .goright
2430 CPY len
2440 BEQ goneright
2450 JSR oswrch
2460 INY
2470 JMP goright
2480 .goneright
2490 LDA #delete
2500 .rid
2510 JSR oswrch
2520 DEY
2530 BNE rid
2540 .nodelete
2550 LDA #0
2560 TAY
2570 STA len
2580 STA index
2590 LDX startstore
2600 .display
2610 LDA store,X
2620 CMP #CR
2630 BEQ tidyup
2640 JSR oswrch
2650 STA (linezp),Y
2660 INX
2670 INY
2680 INC len
2690 INC index
2700 JMP display
2710 .tidyup
2720 INX
2730 STX startstore
2740 .snext
2750 LDA store,X
2760 CMP #CR
2770 BEQ hoploop3
2780 INX
2790 BNE snext
2800 STX startstore
2810 JMP readloop3
2820 :
2830 .ntest7
2840 CMP #CR
2850 BNE ordinary
2860 JSR osasci
2870 LDY len
2880 STA (linezp),Y
2890 INC len
2900 INY
2910 LDA #1
2920 STA startf
2930 LDA #&FF
2940 TAY
2950 SEC
2960 SBC len
2970 TAX
2980 .shift
2990 LDA store,X
3000 STA store,Y
3010 DEY
3020 DEX
3030 CPX #&FF
3040 BNE shift
3050 LDY len
3060 .transfer
3070 DEY
3080 LDA (linezp),Y
3090 STA store,Y
3100 CPY #0
3110 BNE transfer
3120 CLC
3130 LDY len
3140 DEY
3150 RTS
3160 \
3170 .ordinary
3180 STA char
3190 LDA len
3200 CMP maxlen
3210 BCC skip1
3220 JMP readloop1
3230 .skip1
3240 LDA char
3250 CMP minchar
3260 BCC forget
3270 LDA maxchar
3280 CMP char
3290 BCS inrange
3300 .forget
3310 JMP readloop2
3320 .inrange
3330 LDA char
3340 JSR oswrch
3350 LDA insertf
3360 BEQ storeit
3370 LDY index
3380 CPY len
3390 BEQ storeit
3400 LDA (linezp),Y
3410 STA next
3420 .show
3430 LDA next
3440 JSR oswrch
3450 INY
3460 PHA
3470 LDA (linezp),Y
3480 STA next
3490 PLA
3500 STA (linezp),Y
3510 CPY len
3520 BNE show
3530 LDA #left
3540 .whizzleft
3550 JSR oswrch
3560 DEY
3570 CPY index
3580 BNE whizzleft
3590 INC len
3600 .storeit
3610 LDA char
3620 LDY index
3630 STA (linezp),Y
3640 INC index
3650 LDA len
3660 CMP index
3670 BCS hoploop
3680 INC len
3690 .hoploop
3700 JMP readloop3
3710 .oldv
3720 ]:P%=P%+2:[ OPT pa
ss
3730 .store
3740 ]:P%=P%+256:[ OPT
pass
3750 .insertf
3760 ]:P%=P%+1:[ OPT pa
ss
3770 .startf
3780 ]:P%=P%+1:[ OPT pa
ss
3790 .xytable
3800 ]:P%=P%+2:[ OPT pa
ss
3810 .maxlen
3820 ]:P%=P%+1:[ OPT pa
ss
3830 .minchar
3840 ]:P%=P%+1:[ OPT pa
ss
3850 .maxchar
3860 ]:P%=P%+1:[ OPT pa
ss
3870 .len
3880 ]:P%=P%+1:[ OPT pa
ss
3890 .index
3900 ]:P%=P%+1:[ OPT pa
ss
3910 .startstore
3920 ]:P%=P%+1:[ OPT pa
ss
3930 .char
3940 ]:P%=P%+1:[ OPT pa
ss
3950 .next
3960 ]:P%=P%+1:[ OPT pa
ss
3970 :
3980 ]:NEXT pass
3990 ENDPROC
4000 :
4010 DEF PROCsave
4020 DIM B% 30
4030 $B%="SAVE retcode
"+STR$~(Y%)+" +3FF"
4040 X%=B% MOD 256
4050 Y%=B% DIV 256
4060 CALL &FFF7
4070 ENDPROC
```

**See Arc Agora, page 46**

**Listing 1. Function Keystrip Editor**

```
10 REM Agora - listing 1
20 REM Keystrip Editor
30 REM by Terry Blunt
40 REM for A/M/C
50 REM (c) BAU May 1989
60 :
70 *SHADOW
80 MODE 0
90 PROCwait
100 PROCinit
110 PROCdisplay
120 ON ERROR PROCerror
130 PROCtext
140 cur%=FALSE
150 IF flag% PROCshow
160 VDU 7
170 frame%=0
180 box%=0
190 row%=0
200 col%=0
210 REPEAT
220 VDU 5
230 MOVE (box%*wide%+col%+1)*X%+4,top%
-(row%+frame%*(high%+1))*Y%-4
240 GCOL 3,1
250 VDU 255,8
260 cur%=TRUE
270 key%=GET
280 VDU 255,8
290 cur%=FALSE
300 IF key%>=32 AND key%<127 PROCinser
t
310 IF key%=127 PROCdelete
320 IF key%=13 PROCreturn
```

**Continued ▶**

◀ **Function Keystrip Editor, continued**

```
 330 IF key%>=129 AND key%<=137 PROCcon
trol
 340 IF key%>=140 AND key%<=143 PROCmov
e
 350 PROCcheck
 360 UNTIL FALSE
 370 :
 380 DEF PROCinit
 390 high%=6
 400 hi%=high%-1
 410 wide%=11
 420 gap%=41
 430 wi%=wide%-1
 440 last%=11
 450 max%=3
 460 DIM main%(max%,hi%,wi%,last%)
 470 DIM bars%(max%,hi%,last%)
 480 DIM title$(max%)
 490 DIM chars%(94,4)
 500 FOR strip%=0 TO max%
 510 title$(strip%)=STRING$(22," ")
 520 FOR box%=0 TO last%
 530 bars%(strip%,0,box%)=1
 540 NEXT
 550 NEXT
 560 FOR i%=0 TO 94
 570 FOR j%=0 TO 4
 580 READ chars%(i%,j%)
 590 NEXT
 600 NEXT
 610 *FX 225,128
 620 *FX 4 2
 630 CLOSE#0
 640 X%=28
 650 Y%=36
 660 top%=990
 670 set%=3
 680 group%=(last%+1) DIV (set%+1)-1
 690 flag%=FALSE
 700 margin%=32
 710 strip%=0
 720 VDU 23,255,255,255,255,255,255,255
,255,255
 730 ENDPROC
 740 :
 750 DEF PROCdisplay
 760 VDU 23;10,64;0;0;0;
 770 VDU 5
 780 FOR frame%=0 TO group%
 790 FOR box%=0 TO set%
 800 MOVE (box%*wide%+wide%/2)*X%,top%-
frame%*(high%+1)*Y%+Y%-4
 810 PRINT "f";frame%*4+box%+1
 820 MOVE (box%*wide%+1)*X%,top%-frame%
*(high%+1)*Y%
 830 DRAW (box%*wide%+1)*X%,top%-(frame
%*(high%+1)+high%)*Y%
 840 DRAW ((box%+1)*wide%+1)*X%-2,top%-
(frame%*(high%+1)+high%)*Y%
 850 DRAW ((box%+1)*wide%+1)*X%-2,top%-
frame%*(high%+1)*Y%
 860 DRAW (box%*wide%+1)*X%,top%-frame%
*(high%+1)*Y%
 870 NEXT
 880 NEXT
 890 ENDPROC
 900 :
 910 DEF PROCtext
 920 VDU 4
 930 PROCwind(24)
 940 PRINT SPC7"Use cursor keys to move
 in box & with SHIFT to move between box
es"
 950 PRINT TAB(0,1)"f1 Clear strip"
 960 PRINT TAB(20,1)"f2 Load file"
 970 PRINT TAB(40,1)"f3 Save file"
 980 PRINT TAB(60,1)"f4 Select strip:"
 990 PRINT TAB(0,2)"f5 Divider"
1000 PRINT TAB(20,2)"f6 Copy strip"
1010 PRINT TAB(40,2)"f7 Print strips"
1020 PRINT TAB(60,2)"f8 Strip title:"
1030 PRINT TAB(0,3)"f9 * command"
1040 PRINT TAB(77,1);strip%+1 TAB(57,3)
 LEFT$(title$(strip%),11) " " RIGHT$(tit
le$(strip%),11)
1050 PRINT TAB(77,1);strip%+1 TAB(57,3)
 LEFT$(title$(strip%),11) " " RIGHT$(tit
le$(strip%),11)
1060 PROCwind(28)
1070 ENDPROC
1080 :
1090 DEF PROCcontrol
1100 IF key%=133 PROCdivide:ENDPROC
1110 VDU 4
1120 CLS
1130 IF key%=129 PROCclear
1140 IF key%=130 PROCload
1150 IF key%=131 PROCsave
1160 IF key%=132 strip%=FNnumber("keyst
rip number")-1:flag%=TRUE
1170 IF key%=134 PROCcopy
1180 IF key%=135 PROCprint
1190 IF key%=136 PROCtitle
1200 IF key%=137 PROCstar
1210 IF flag% PROCwait:PROCshow
1220 VDU 5,7
1230 PROCtext
1240 ENDPROC
1250 :
1260 DEF PROCclear
1270 LOCAL box%,col%,row%
1280 flag%=TRUE
1290 PROCwait
1300 title$(strip%)=STRING$(22," ")
1310 FOR box%=0 TO last%
1320 FOR col%=0 TO wi%
1330 FOR row%=0 TO hi%
1340 main%(strip%,row%,col%,box%)=0
1350 NEXT
1360 NEXT
1370 FOR row%=1 TO hi%
1380 bars%(strip%,row%,box%)=0
1390 NEXT
1400 NEXT
1410 ENDPROC
1420 :
1430 DEF PROCload
1440 LOCAL box%,col%,row%
1450 INPUT "Enter file to load >" file$
1460 file%=OPENIN file$
1470 IF file%=0 PROCkey("No such file")
:ENDPROC
1480 FOR i%=0 TO 9
1490 IF BGET#file%<>i% i%=50
1500 NEXT
1510 IF i%>20 CLOSE#file%:PROCkey("Inva
lid file"):ENDPROC
1520 PROCwait
1530 flag%=TRUE
1540 INPUT#file%,title$(strip%)
1550 FOR box%=0 TO last%
1560 FOR col%=0 TO wi%
1570 FOR row%=0 TO hi%
1580 main%(strip%,row%,col%,box%)=BGET#
file%
1590 NEXT
1600 NEXT
1610 FOR row%=1 TO hi%
1620 bars%(strip%,row%,box%)=BGET#file%
1630 NEXT
1640 NEXT
1650 CLOSE#file%
1660 ENDPROC
1670 :
1680 DEF PROCsave
1690 LOCAL box%,col%,row%
1700 INPUT "Enter file to save >" file$
1710 file%=OPENIN file$
1720 IF file%>0 CLOSE#file%:IF NOT FNqu
ery("File exists! Over-write") ENDPROC
1730 PROCwait
1740 file%=OPENOUT file$
1750 FOR i%=0 TO 9
1760 BPUT#file%,i%
1770 NEXT
1780 PRINT#file%,title$(strip%)
1790 FOR box%=0 TO last%
1800 FOR col%=0 TO wi%
1810 FOR row%=0 TO hi%
```

Continued ▶

◀ **Function Keystrip Editor, continued**

```
 1820 BPUT#file%,main%(strip%,row%,col%,
box%)
 1830 NEXT
 1840 NEXT
 1850 FOR row%=1 TO hi%
 1860 BPUT#file%,bars%(strip%,row%,box%)
 1870 NEXT
 1880 NEXT
 1890 CLOSE#file%
 1900 ENDPROC
 1910 :
 1920 DEF PROCdivide
 1930 IF row%=0 ENDPROC
 1940 GCOL 3,1
 1950 PROCbar
 1960 bars%(strip%,row%,box%+frame%*4)=b
ars%(strip%,row%,box%+frame%*4) EOR 1
 1970 ENDPROC
 1980 :
 1990 DEF PROCcopy
 2000 LOCAL box%,col%,row%
 2010 old%=FNnumber("strip number to cop
y from")-1
 2020 flag%=TRUE
 2030 PROCwait
 2040 title$(strip%)=title$(old%)
 2050 FOR box%=0 TO last%
 2060 FOR col%=0 TO wi%
 2070 FOR row%=0 TO hi%
 2080 main%(strip%,row%,col%,box%)=main%
(old%,row%,col%,box%)
 2090 NEXT
 2100 NEXT
 2110 FOR row%=1 TO hi%
 2120 bars%(strip%,row%,box%)=bars%(old%
,row%,box%)
 2130 NEXT
 2140 NEXT
 2150 ENDPROC
 2160 :
 2170 DEF PROCprint
 2180 LOCAL box%,col%
 2190 num%=FNnumber("number of strips wi
de")
 2200 PROCkey("Switch on printer")
 2210 PROCwait
 2220 size%=(margin%+high%*11+12)*num%
 2230 mid%=(last%+1)*wide% DIV 2-1
 2240 VDU 2
 2250 VDU 1,27,1,51,1,2
 2260 FOR box%=0 TO last%
 2270 PROCline(num%-1,high%*11-1)
 2280 FOR col%=0 TO wi%
 2290 PROCsend(box%,col%,box%*wide%+col%
)
 2300 NEXT
 2310 IF box% MOD (set%+1)=group%+1 PROC
gap
 2320 NEXT
 2330 VDU 3
 2340 ENDPROC
 2350 :
 2360 DEF PROCtitle
 2370 INPUT "Enter strip title 1st word
(11 letters max) >" title$(strip%)
 2380 title$(strip%)=LEFT$(title$(strip%
),11)
 2390 title$(strip%)=STRING$(11-LENtitle
$(strip%)," ")+title$(strip%)
 2400 INPUT "Enter strip title 2nd word
(11 letters max) >" a$
 2410 title$(strip%)=LEFT$(title$(strip%
)+a$+STRING$(11," "),22)
 2420 ENDPROC
 2430 :
 2440 DEF PROCstar
 2450 PROCwind(24)
 2460 REPEAT
 2470 INPUT "*" a$
 2480 OSCLI a$
 2490 PROCkey("OK")
 2500 UNTIL a%<>ASC"*" AND a%<>9
 2510 ENDPROC
 2520 :
 2530 DEF PROCinsert
 2540 main%(strip%,row%,col%,box%+frame%
*4)=key%-32
 2550 GCOL 0,0
 2560 VDU 255,8
 2570 GCOL 0,1
 2580 VDU key%
 2590 col%=col%+1
 2600 ENDPROC
 2610 :
 2620 DEF PROCdelete
 2630 col%=col%-1
 2640 PROCcheck
 2650 GCOL 0,0
 2660 MOVE (box%*wide%+col%+1)*X%+4,top%
-(row%+frame%*(high%+1))*Y%-4
 2670 VDU 255,8
 2680 main%(strip%,row%,col%,box%+frame%
*4)=0
 2690 ENDPROC
 2700 :
 2710 DEF PROCreturn
 2720 col%=0
 2730 row%=row%+1
 2740 PROCcheck
 2750 ENDPROC
 2760 :
 2770 DEF PROCmove
 2780 IF INKEY-1 PROCbox ELSE PROCcursor
 2790 ENDPROC
 2800 :
 2810 DEF PROCbox
 2820 box%=box%+(key%=140)-(key%=141)
 2830 frame%=frame%+(key%=143)-(key%=142
)
 2840 ENDPROC
 2850 :
 2860 DEF PROCcursor
 2870 col%=col%+(key%=140)-(key%=141)
 2880 row%=row%+(key%=143)-(key%=142)
 2890 ENDPROC
 2900 :
 2910 DEF PROCshow
 2920 LOCAL frame%,box%,col%,row%
 2930 VDU 5
 2940 FOR frame%=0 TO group%
 2950 FOR box%=0 TO set%
 2960 FOR col%=0 TO wi%
 2970 FOR row%=0 TO hi%
 2980 MOVE X%+4+(box%*wide%+col%)*X%,top
%-(row%+frame%*(high%+1))*Y%-4
 2990 GCOL 0,0
 3000 VDU 255,8
 3010 GCOL 0,1
 3020 VDU main%(strip%,row%,col%,box%+fr
ame%*4)+32
 3030 NEXT
 3040 NEXT
 3050 FOR row%=1 TO hi%
 3060 GCOL 0,bars%(strip%,row%,box%+fram
e%*4)
 3070 PROCbar
 3080 NEXT
 3090 NEXT
 3100 NEXT
 3110 flag%=FALSE
 3120 ENDPROC
 3130 :
 3140 DEF PROCcheck
 3150 IF col%=wide% col%=0 ELSE IF col%<
0 col%=wi%
 3160 IF row%=high% row%=0 ELSE IF row%<
0 row%=hi%
 3170 IF box%>set% box%=0 ELSE IF box%<0
 box%=set%
 3180 IF frame%>group% frame%=0 ELSE IF
frame%<0 frame%=group%
 3190 ENDPROC
 3200 :
 3210 DEF PROCsend(box%,col%,width%)
 3220 LOCAL dot%,row%,sel%,pos%
 3230 PRINT
 3240 FOR dot%=0 TO 4
 3250 VDU 1,27,1,75,1,size% MOD 256,1,si
ze% DIV 256
 3260 FOR sel%=0 TO num%-1
```

Continued ▶

**◀ Function Keystrip Editor, continued**

```
3270 PROCmargin(margin%)
3280 VDU 1,dot% MOD 3
3290 FOR row%=hi% TO 0 STEP-1
3300 PROCchar(main%(sel%,row%,col%,box%
))
3310 VDU 1,0
3320 VDU 1,bars%(sel%,row%,box%)*dot% M
OD 3
3330 NEXT
3340 pos%=mid%-LEN title$(sel%) DIV 2
3350 VDU 1,0,1,0
3360 IF width%<=pos% OR width%>pos%+LEN
 title$(sel%) PROCmargin(9) ELSE PROCcha
r(ASC MID$(title$(sel%),width%-pos%)-32)
3370 NEXT
3380 VDU 1,10,1,13
3390 NEXT
3400 VDU 1,10,1,13
3410 ENDPROC
3420 :
3430 DEF PROCline(num%,height%)
3440 LOCAL sel%,row%
3450 PRINT'
3460 VDU 1,27,1,75,1,size% MOD 256,1,si
ze% DIV 256
3470 FOR sel%=0 TO num%
3480 PROCmargin(margin%)
3490 FOR row%=0 TO height%
3500 VDU 1,row% MOD 2
3510 NEXT
3520 PROCmargin(12)
3530 NEXT
3540 VDU 1,10,1,13,1,10,1,13
3550 ENDPROC
3560 :
3570 DEF PROCgap
3580 PROCline(num%-1,high%*11-1)
3590 FOR g%=1 TO gap%
3600 VDU 1,10,1,13
3610 NEXT
3620 ENDPROC
3630 :
3640 DEF PROCmargin(width%)
3650 LOCAL i%
3660 FOR i%=1 TO width%
3670 VDU 1,0
3680 NEXT
3690 ENDPROC
3700 :
3710 DEF PROCchar(col%)
3720 LOCAL a%
3730 a%=chars%(col%,dot%)
3740 FOR i%=0 TO 8
3750 VDU 1,-(a%>255)
3760 a%=a%*2 AND 511
3770 NEXT
3780 ENDPROC
3790 :
3800 DEF PROCbar
3810 MOVE X%+box%*wide%*X%+4,top%-(fram
e%*(high%+1)+row%)*Y%
3820 DRAW X%+((box%+1)*wide%)*X%-4,top%
-(frame%*(high%+1)+row%)*Y%
3830 ENDPROC
3840 :
3850 DEF PROCwait
3860 PROCwind(28)
3870 PRINT SPC35"PLEASE WAIT";
3880 ENDPROC
3890 :
3900 DEF PROCwind(a%)
3910 VDU 28,0,31,79,a%
3920 CLS
3930 ENDPROC
3940 :
3950 DEF FNnumber(a$)
3960 PRINT "Enter "+a$+" (1-";max%+1 ")
";
3970 REPEAT
3980 a%=GET
3990 UNTIL a%>ASC"0" AND a%<ASC"2"+max%
4000 PRINT CHR$ a%
4010 =a%-ASC"0"
4020 :
4030 DEF FNquery(a$)
4040 PRINT a$ "? (Y/N) ";
4050 REPEAT
4060 a%=GET AND 95
4070 UNTIL a%=ASC"Y" OR a%=ASC"N"
4080 PRINT CHR$ a%
4090 =a%=ASC"Y"
4100 :
4110 DEF PROCkey(a$)
4120 PRINT a$ " - Press a key";
4130 a%=GET
4140 PRINT
4150 ENDPROC
4160 :
4170 DEF PROCerror
4180 *FX 15
4190 IF cur% VDU 255
4200 VDU 4,3
4210 CLOSE#0
4220 PROCwind(28)
4230 IF ERR=17 AND NOT INKEY-1 ENDPROC
4240 IF ERR=204 PROCkey("Name too long"
):ENDPROC
4250 PROCwind(24)
4260 REPORT
4270 PRINT " at line ";ERL
4280 *FX 4
4290 END
4300 :
4310 DATA 0,0,0,0,0
4320 DATA 0,0,79,0,0
4330 DATA 0,7,0,7,0
4340 DATA 20,127,20,127,20
4350 DATA 4,42,127,42,16
4360 DATA 67,51,8,102,97
4370 DATA 54,73,86,32,88
4380 DATA 0,0,2,1,0
4390 DATA 0,0,28,99,0
4400 DATA 0,99,28,0,0
4410 DATA 8,42,28,42,8
4420 DATA 8,8,62,8,8
4430 DATA 0,352,224,0,0
4440 DATA 8,8,8,8,8
4450 DATA 0,96,96,0,0
4460 DATA 64,48,8,6,1
4470 DATA 28,34,65,34,28
4480 DATA 0,66,127,64,0
4490 DATA 66,97,81,73,70
4500 DATA 33,65,69,75,49
4510 DATA 24,22,17,127,16
4520 DATA 39,69,69,69,57
4530 DATA 48,76,74,73,48
4540 DATA 1,97,25,7,1
4550 DATA 54,73,73,73,54
4560 DATA 6,73,41,25,6
4570 DATA 0,108,108,0,0
4580 DATA 0,364,236,0,0
4590 DATA 8,20,34,65,0
4600 DATA 20,20,20,20,20
4610 DATA 0,65,34,20,8
4620 DATA 2,1,81,9,6
4630 DATA 62,65,73,85,94
4640 DATA 124,18,17,18,124
4650 DATA 65,127,73,73,54
4660 DATA 62,65,65,65,34
4670 DATA 65,127,65,65,62
4680 DATA 127,73,73,73,65
4690 DATA 127,9,9,9,1
4700 DATA 62,65,73,73,58
4710 DATA 127,8,8,8,127
4720 DATA 0,65,127,65,0
4730 DATA 32,65,65,63,1
4740 DATA 127,8,20,34,65
4750 DATA 127,64,64,64,64
4760 DATA 127,2,12,2,127
4770 DATA 127,2,28,32,127
4780 DATA 62,65,65,65,62
4790 DATA 127,9,9,9,6
4800 DATA 62,65,81,33,94
4810 DATA 127,9,9,25,102
4820 DATA 38,73,73,73,50
4830 DATA 1,1,127,1,1
4840 DATA 63,64,64,64,63
4850 DATA 15,48,64,48,15
4860 DATA 63,96,24,96,63
4870 DATA 65,54,28,54,65
4880 DATA 3,12,112,12,3
4890 DATA 97,81,73,69,67
```

Continued▶

# JOE'S JOTTINGS

## ◀ Function Keystrip Editor, continued

```
4900 DATA 0,127,65,65,0
4910 DATA 1,6,8,48,64
4920 DATA 0,65,65,127,0
4930 DATA 4,2,1,2,4
4940 DATA 256,256,256,256,256
4950 DATA 72,126,73,65,66
4960 DATA 32,84,84,84,120
4970 DATA 127,68,68,68,56
4980 DATA 56,68,68,68,68
4990 DATA 56,68,68,68,127
5000 DATA 56,84,84,84,88
5010 DATA 4,126,5,5,1
5020 DATA 56,324,324,324,252
5030 DATA 127,4,4,4,120
5040 DATA 0,68,125,64,0
5050 DATA 256,256,256,253,0
5060 DATA 127,16,16,40,68
5070 DATA 0,65,127,64,0
5080 DATA 120,4,120,4,120
5090 DATA 124,4,4,4,120
5100 DATA 56,68,68,68,56
5110 DATA 508,68,68,68,56
5120 DATA 56,68,68,68,508
5130 DATA 124,8,4,4,4
5140 DATA 8,84,84,84,32
5150 DATA 4,63,68,64,0
5160 DATA 60,64,64,64,124
5170 DATA 12,48,64,48,12
5180 DATA 60,96,48,96,60
5190 DATA 68,40,16,40,68
5200 DATA 60,320,320,320,252
5210 DATA 68,100,84,76,68
5220 DATA 0,8,62,65,0
5230 DATA 0,0,119,0,0
5240 DATA 0,65,62,8,0
5250 DATA 2,1,3,2,1
```

## Listing 2. !Boot file creator

```
   10 REM Agora - listing 2
   20 REM !Boot Creator
   30 REM by Martin Webb
   40 REM for Archimedes only
   50 REM (c) BAU May 1989
   60 :
   70 filename$="$.!Boot"
   80 file%=OPENOUT(filename$)
   90 REPEAT
  100 READ data$
  110 IF data$<>"Q" BPUT#file%,data$
  120 UNTIL data$="Q"
  130 CLOSE#file%
  140 OSCLI("SETTYPE "+filename$+" FFF")
  150 PRINT"!Boot file created."
  160 END
  170 :
  180 DATA "REM Demonstration !Boot file
"
  190 DATA
  200 DATA
  210 DATA QUIT
  220 DATA RMCLEAR
  230 DATA DIR $.Modules
  240 DATA RMLOAD Menu_Rm
  250 DATA UP
  260 DATA BASIC
  270 DATA CLS
  280 DATA *MODULES
  290 DATA OLD
  300 DATA LIST
  310 DATA Q
```

See Joe's Jottings, page 73

```
   10 REM Market Survey
   20 REM by Joe Telford
   30 REM for B+/M/C
   40 REM (c) BAU May 1989
   50 :
   60 MODE 129
   70 VDU 23;8202;0;0;0;
   80 ptr=0:col=0:m=1:z%=&90A
   90 PROCsetup
  100 ON ERROR PROCerr
  110 REPEAT
  120 PROCscreen(0)
  130 IF erflag<>2 THEN choice=FNchoose(
0)
  140 erflag=0
  150 IF choice=1 THEN PROCfiles
  160 IF choice=2 THEN PROCedit
  170 IF choice=3 THEN PROCsort
  180 IF choice=4 THEN PROCdisplay
  190 IF choice=5 THEN RUN
  200 UNTIL choice = 6
  210 MODE 7
  220 END
  230 :
  240 DEF PROCcat
  250 CLS
  260 *CAT
  270 PRINT TAB(0,0);STRING$(120," ")
  280 PROCdh("Press SPACE to return.",7,
0)
  290 REPEAT UNTIL GET=32
  300 ENDPROC
  310 :
  320 DEF PROCload
  330 REPEAT
  340 PROCscreen(0)
  350 PROCdh("Open a Survey File",11,6)
  360 PROCfilebody
  370 UNTIL F$>""
  380 ch%=OPENUP F$
  390 IF ch%=0 THEN PROCscreen(0):PROCdh
("Open a Survey File",11,6):PROCdh(F$+"
is not on this disc",6,10):VDU 7:A=INKEY
(300):ENDPROC
  400 T%=BGET# ch%
  410 IF T%<>ASC"S":CLOSE# ch%:PROCscree
n(0):PROCdh("Open a Survey File",11,6):P
ROCdh(F$+" is not a survey file",6,10):V
DU 7:A=INKEY(300):ENDPROC
  420 INPUT# ch%,S$,hd,ca
  430 FOR hdng%=1 TO hd
  440 INPUT# ch%,S$(hdng%)
  450 FOR categ%=1 TO ca
  460 INPUT# ch%,Q$(hdng%,categ%)
  470 INPUT# ch%,Q(hdng%,categ%)
  480 NEXT:NEXT
  490 CLOSE# ch%
  500 ENDPROC
  510 :
  520 DEF PROCdelf
  530 REPEAT
  540 PROCscreen(0)
  550 PROCdh("Delete a File",14,6)
  560 PROCfilebody
  570 UNTIL F$>""
  580 ch%=OPENUP F$:CLOSE# ch%
  590 IF ch%=0 THEN PROCscreen(0):PROCdh
("Delete a File",14,6):PROCdh(F$+" is no
t on this disc",6,10):VDU 7:A=INKEY(300)
:ENDPROC
  600 OSCLI("DELETE "+F$)
  610 ENDPROC
  620 :
  630 DEF PROCsave
  640 REPEAT
  650 PROCscreen(0)
  660 PROCdh("Save a Survey File",11,6)
  670 PROCfilebody
  680 UNTIL F$>""
  690 ch%=OPENUP F$:CLOSE# ch%
  700 IF ch%<>0 THEN PROCscreen(0):PROCd
h("Save a Survey File",11,6):PROCdh(F$+"
 already used on this disc",3,10):VDU 7:
A=INKEY(300):ENDPROC
  710 ch%=OPENOUTF$
  720 BPUT# ch%,ASC("S")
  730 PRINT# ch%,S$,hd,ca
  740 FOR hdng%=1 TO hd
  750 PRINT# ch%,S$(hdng%)
  760 FOR categ%=1 TO ca
  770 PRINT# ch%,Q$(hdng%,categ%)
  780 PRINT# ch%,Q(hdng%,categ%)
  790 NEXT:NEXT
  800 CLOSE# ch%
  810 ENDPROC
  820 :
```

Continued ▶

◀ Joe's Jottings, continued

```
 830 DEF PROCpdraft
 840 PROCscreen(0)
 850 PROCdh("To print a draft copy -",9
,6)
 860 PROCdh("Setup your printer",11,10)
 870 PROCdh("then press RETURN!",11,14)
 880 REPEAT UNTIL GET=13
 890 *FX 3,10
 900 VDU 2
 910 PRINT "Survey: ";S$'
 920 FOR hdng%=1 TO hd
 930 PRINT'S$(hdng%)
 940 FOR categ%=1 TO ca STEP2
 950 PRINT TAB(10);Q$(hdng%,categ%);SPC
(12-LEN(Q$(hdng%,categ%)));
 960 PRINT Q(hdng%,categ%);
 970 PRINT SPC(10);Q$(hdng%,categ%+1);S
PC(12-LEN(Q$(hdng%,categ%+1)));
 980 PRINT Q(hdng%,categ%+1)
 990 NEXT:NEXT
 1000 VDU 3:*FX 3,0
 1010 ENDPROC
 1020 :
 1030 DEF PROCfilebody
 1040 PROCdh("Please type the survey nam
e,",6,10)
 1050 PROCdh("Or press RETURN alone for
catalogue",2,18)
 1060 F$=FNgpi(7,0,cap$+low$+nos$+".$",1
7,14,1)
 1070 IF F$="" THEN PROCcat
 1080 ENDPROC
 1090 :
 1100 DEF PROCname
 1110 PROCscreen(0)
 1120 PROCdh("Please type the name of th
is survey.",2,8)
 1130 REPEAT
 1140 S$=FNgpi(38,0,all$,1,12,1)
 1150 UNTIL S$>" "
 1160 ENDPROC
 1170 :
 1180 DEF PROCheadings(n)
 1190 PROCscreen(0)
 1200 IF n=0 PROCdh("Survey Headings.",1
2,3)
 1210 IF n=1 PROCdh("First select a head
ing.",9,3)
 1220 PROCpsections
 1230 erflag=2
 1240 *FX 4,1
 1250 ptr=1:REPEAT
 1260 REPEAT PROChhead
 1270 A=GET
 1280 IF A=138 THEN ptr=ptr+1:PROChhead
 1290 IF A=139 THEN ptr=ptr-1:PROChhead
 1300 UNTIL A=9
 1310 IF n=1 THEN UNTILTRUE:ENDPROC
 1320 S$(ptr)=FNgpi(27,0,all$,12,ptr*2+4
,0)
 1330 UNTIL 0
 1340 ENDPROC
 1350 :
 1360 DEF PROChhead
 1370 IF ptr<1 ptr=1
 1380 IF ptr>hd ptr=hd
 1390 LOCAL loop%
 1400 FOR loop%= 1 TO hd
 1410 IF ptr=loop% THEN COLOUR 131:COLOU
R 0:ELSE COLOUR 128:COLOUR 3
 1420 PRINT TAB(12,loop%*2+4);S$(loop%);
STRING$(27-LENS$(loop%),".");
 1430 NEXT
 1440 ENDPROC
 1450 :
 1460 DEF PROCpsections
 1470 FOR loop%=1 TO hd
 1480 PRINT TAB(1,loop%*2+4);"Section ";
:IF loop%<10 THEN PRINT" ";
 1490 PRINT;loop%;
 1500 NEXT
 1510 IF n=0 PRINT TAB(2,28)"^ & v to mo
ve - TAB to enter heading"
 1520 IF n=0 PROCdh(" Press Escape when
you are finished ",2,30)
 1530 IF n=1 PROCdh("    ^ & v to move -
TAB to select      ",2,30)
 1540 ENDPROC
 1550 :
 1560 DEF PROCcategs(m)
 1570 PROCheadings(1)
 1580 cflag=ptr
 1590 PROCscreen(cflag)
 1600 PROCpcategs
 1610 erflag=2
 1620 *FX 4,1
 1630 ptr=1:col=1:REPEAT
 1640 REPEAT PROChcats
 1650 A=GET
 1660 IF m=0 THEN IF A=138 THEN ptr=ptr+
1
 1670 IF m=0 THEN IF A=139 THEN ptr=ptr-
1
 1680 IF A=136 THEN col=col-1
 1690 IF A=137 THEN col=col+1
 1700 PROCcheck:PROChcats
 1710 UNTIL A=9
 1720 IF m=1 THEN UNTILTRUE:erflag=0:END
PROC
 1730 IF col=0 THEN Q$(cflag,ptr)=FNgpi(
10,0,all$,8,ptr*2+6,0)
 1740 IF col=1 THEN Q(cflag,ptr)=VAL(FNg
pi(10,0,nos$,20,ptr*2+6,0))
 1750 UNTIL 0
 1760 ENDPROC
 1770 :
 1780 DEF PROCcheck
 1790 IF col<0 col=0
 1800 IF col>1 col=1
 1810 IF ptr>ca ptr=ca
 1820 IF ptr<1 ptr=1
 1830 ENDPROC
 1840 :
 1850 DEF PROChcats
 1860 LOCAL loop%
 1870 FOR loop%=1 TO ca
 1880 IF ptr=loop% AND col=0 THEN COLOUR
 131:COLOUR 0:ELSE COLOUR 128:COLOUR 3
 1890 PRINT TAB(8,loop%*2+6);Q$(cflag,lo
op%);STRING$(10-LEN(Q$(cflag,loop%)),"."
);
 1900 IF ptr=loop% AND col=1 THEN COLOUR
 131:COLOUR 0:ELSE COLOUR 128:COLOUR 3
 1910 PRINT TAB(20,loop%*2+6)Q(cflag,loo
p%);
 1920 NEXT
 1930 ENDPROC
 1940 :
 1950 DEF PROCpcategs
 1960 FOR loop%=1 TO ca
 1970 PROCrect(224,1040-(loop%*2+8)*32,3
84,64,0)
 1980 PROCrect(608,1040-(loop%*2+8)*32,3
84,64,0)
 1990 NEXT
 2000 IF m=0 THEN PRINTTAB(5,28)"< ^ v >
 move - TAB enters data"
 2010 IF m=0 THEN PROCdh(" Press Escape
when you are finished ",2,30)
 2020 IF m=1 THEN PROCdh(" < > move - TA
B selects sort column ",2,30)
 2030 ENDPROC
 2040 :
 2050 DEF PROCfiles
 2060 REPEAT PROCscreen(0):choose=FNchoo
se(1)
 2070 IF choose=1 THEN PROCcat
 2080 IF choose=2 THEN PROCload
 2090 IF choose=3 THEN PROCsave
 2100 IF choose=4 THEN PROCdelf
 2110 IF choose=5 THEN PROCpdraft
 2120 UNTIL choose=6
 2130 ENDPROC
 2140 :
 2150 DEF PROCedit
 2160 REPEAT PROCscreen(0):choose=FNchoo
se(2)
 2170 IF choose=1 THEN PROCname
 2180 IF choose=2 THEN PROCheadings(0)
 2190 IF choose=3 THEN PROCcategs(0)
 2200 UNTIL choose=4
 2210 ENDPROC
```

Continued ▶

◀ Joe's Jottings, continued

```
2220 :
2230 DEF PROCsort
2240 LOCAL section,column
2250 PROCcategs(1)
2260 section=cflag
2270 column=col
2280 IF column=0 THEN PROCstringsort(se
ction)
2290 IF column=1 THEN PROCnumbersort(se
ction)
2300 PROChcats
2310 erflag=0
2320 PROCdh("        Press SPACE TO retu
rn      ",3,30)
2330 REPEAT UNTIL GET=32
2340 ENDPROC
2350 :
2360 DEF PROCnumbersort(sec)
2370 LOCAL loop1%,loop2%
2380 FOR loop1%=1 TO ca
2390 FOR loop2%=1 TO ca-1
2400 IF Q(sec,loop2%)<Q(sec,loop2%+1) T
HEN PROCswap(sec,loop2%,loop2%+1)
2410 NEXT:NEXT
2420 ENDPROC
2430 :
2440 DEF PROCswap(s,a,b)
2450 spare=Q(s,a):spare$=Q$(s,a)
2460 Q(s,a)=Q(s,b):Q$(s,a)=Q$(s,b)
2470 Q(s,b)=spare:Q$(s,b)=spare$
2480 IF Q$(s,b)=CHR$(255) THEN Q$(s,b)=
""
2490 IF Q$(s,a)=CHR$(255) THEN Q$(s,a)=
""
2500 ENDPROC
2510 :
2520 DEF PROCstringsort(sec)
2530 LOCAL loop1%,loop2%
2540 FOR loop1%=1 TO ca
2550 FOR loop2%=1 TO ca-1
2560 IF Q$(sec,loop2%)="" THEN Q$(sec,l
oop2%)=CHR$(255)
2570 IF Q$(sec,loop2%)>=Q$(sec,loop2%+1
) THEN PROCswap(sec,loop2%,loop2%+1)
2580 NEXT:NEXT
2590 ENDPROC
2600 :
2610 DEF PROCdisplay
2620 REPEAT PROCscreen(0):choose=FNchoo
se(4)
2630 IF choose=1 THEN PROCtable
2640 IF choose=2 THEN PROCpie
2650 IF choose=3 THEN PROCbar
2660 IF choose=4 THEN PROCline
2670 UNTIL choose=5
2680 ENDPROC
2690 :
2700 DEF PROCpie
2710 PROCheadings(1)
2720 section=ptr
2730 erflag=0
2740 VDU 19,0,0;0;
2750 CLS
2760 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
2770 number=FNfindblank
2780 PROCmaxmin
2790 PROCdrawpiechart(section,number,ma
x,min)
2800 PROCbase(1)
2810 ENDPROC
2820 :
2830 DEF PROCbar
2840 PROCheadings(1)
2850 section=ptr
2860 erflag=0
2870 VDU 19,0,0;0;
2880 CLS
2890 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
2900 number=FNfindblank
2910 PROCmaxmin
2920 PROCdrawbargraf(section,number,max
,min)
2930 PROCbase(1)
2940 ENDPROC
2950 :
2960 DEF PROCline
2970 PROCheadings(1)
2980 section=ptr
2990 erflag=0
3000 VDU 19,0,0;0;
3010 CLS
3020 PROCdh(S$(section),20-(LEN(S$(sect
ion))/2),0)
3030 number=FNfindblank
3040 PROCmaxmin
3050 PROCdrawlinegraf(section,number,ma
x,min)
3060 PROCbase(1)
3070 ENDPROC
3080 :
3090 DEF PROCmaxmin
3100 LOCAL loop%
3110 min=9999999999:max=-9999999999
3120 FOR loop%=1 TO number
3130 IF Q(section,loop%)>max THEN max=Q
(section,loop%)
3140 IF Q(section,loop%)<min THEN min=Q
(section,loop%)
3150 NEXT
3160 IF min>0 THEN min=0
3170 IF max<0 THEN max=0
3180 ENDPROC
3190 :
3200 DEF FNfindblank
3210 LOCAL loop%,number
3220 number=0
3230 FOR loop%=1 TO ca
3240 IFQ$(section,loop%)="" THEN number
=loop%:loop%=ca
3250 NEXT
3260 number=number-1
3270 IF number=-1 THEN number=ca
3280 =number
3290 :
3300 DEF PROCbase(b)
3310 IF b=0 PROCdh("SPACE-BAR exits / P
 to Print screen.",2,30)
3320 IF b=1 PROCdh(" SPACE-BAR exits /
P to Print screen. ",1,0)
3330 REPEAT A$=GET$:UNTIL A$=" " OR A$=
"P" OR A$="p"
3340 IF A$<>" " THEN PROCdumpout(b)
3350 ENDPROC
3360 :
3370 DEF PROCtable
3380 PROCheadings(1)
3390 cflag=ptr
3400 PROCscreen(cflag)
3410 m=1:PROCpcategs
3420 ptr=0:PROChcats
3430 VDU 19,0,0;0;
3440 erflag=0
3450 PROCbase(0)
3460 ENDPROC
3470 :
3480 DEF PROCerr
3490 *FX 4,0
3500 COLOUR 128:COLOUR 3:*FX 3,0
3510 VDU 3:CLOSE# 0:*FX 15,1
3520 IF ERR=17 THEN ENDPROC
3530 IF ERR=190 OR ERR=198 THEN PROCscr
een(0):PROCdh("This disc is full. Please
 try another.",1,10):VDU 7:A$=INKEY$(300
):ENDPROC
3540 IF ERR=199 THEN PROCscreen(0):PROC
dh("I can't read this disc. Try another.
",1,10):VDU 7:A$=INKEY$(300):ENDPROC
3550 REPORT
3560 PRINT " at line ";ERL
3570 END
3580 :
3590 DEF FNchoose(n)
3600 COLOUR 2
3610 LOCALloop,ch
3620 FOR loop=1 TO M%(n)
3630 PROCdh(STR$loop+". "+M$(n,loop),1+
loop*3,3+loop*3)
3640 NEXT
3650 PROCdh("Which? ",4,24)
3660 REPEAT
```

Continued▶

# JOE'S JOTTINGS

◀ Joe's Jottings, continued

```
3670 ch=VAL(FNgpi(1,0,nos$,11,24,1))
3680 UNTIL ch>0 AND ch<=M%(n)
3690 COLOUR 3
3700 =ch
3710 :
3720 DEF PROCsetup
3730 hd=10:ca=8
3740 S$="Acorn User Survey Program":REM
Survey Title
3750 S%=0:REM number of sections/questi
ons
3760 DIM S$(hd):REM upto 10 sections -
main headings
3770 DIM Q%(ca):REM upto 10 questions p
er section
3780 DIM Q$(hd,ca):REM 10 sections of 8
questions
3790 DIM Q(hd,ca):REM 10 sections of 8
numbers
3800 J$="Another one of Joes Jottings"
3810 menus=6
3820 DIM M$(menus,6),M%(menus)
3830 DATA6,Files,Edit,Sort,Display,New,
Exit
3840 DATA6,Catalogue Disc,Open file,Sav
e File as...,Delete File,Print Draft Cop
y,Main Menu
3850 DATA4,Survey Name,Section Headings
,Categories,Main Menu
3860 DATA3,Sort by name,Sort by Number,
Main Menu
3870 DATA5,Display Table,Display Pie ch
art,Display Bar Graph,Display Line graph
,Main Menu
3880 DATA0
3890 DATA0
3900 LOCAL loop,cats
3910 FOR loop=0 TO menus
3920 READ M%(loop)
3930 IF M%(loop)>0 THEN FOR cats=1 TO M
%(loop):READ M$(loop,cats):NEXT
3940 NEXT
3950 PROCvalid
3960 erflag=0
3970 ENDPROC
3980 :
3990 DEF PROCscreen(n)
4000 CLS
4010 VDU 19,0,1;0;
4020 GCOL 0,3:COLOUR 3
4030 PROCrect(0,32,1278,960,0)
4040 PROCdh(S$,20-(LEN(S$)/2),0)
4050 n$="Section "+STR$(n)
4060 IF n>0 THEN PROCdh(n$,20-(LEN(n$)/
2),2):PROCdh(S$(n),20-(LEN(S$(n))/2),4)
4070 PROCdh(J$,20-(LEN(J$)/2),30)
4080 PRINT TAB(0,0);
4090 ENDPROC
4100 :
4110 DEF FNgpi(len,effect,valid$,x,y,s)
4120 LOCAL a$,b
4130 a$=""
4140 IF s=0 THEN PRINT TAB(x,y);STRING$
(len,".");:ELSE PROCdh(STRING$(len,"."),
x,y)
4150 PRINT TAB(x,y);:*FX 15,1
4160 b=GET:IF b=13 THEN =a$
4170 IF b=127 AND a$="" THEN GOTO 4160
4180 IF b=127 AND s=1 THEN a$=LEFT$(a$,
LEN(a$)-1):PRINT CHR$(b);:PROCextend("H"
,ASC"."):PRINT CHR$(8);:GOTO 4160
4190 IF b=127 AND s=0 THEN a$=LEFT$(a$,
LEN(a$)-1):PRINT CHR$(b);".";CHR$(8);:GO
TO 4160
4200 IF effect=0 THEN GOTO 4230
4210 IF effect=1 b=b AND 223 ELSE b=b O
R 32
4220 IF effect=3 AND(RIGHT$(a$,1)=" " O
R a$="") b=b AND 223
4230 IF LEN(a$)=len OR INSTR(valid$,CHR
$(b))=0 VDU 7:GOTO 4160
4240 IF s=0 THEN VDU b:ELSE PROCextend(
"H",b)
4250 a$=a$+CHR$(b):GOTO 4160
4260 :
4270 DEF PROCvalid
4280 cap$=" ABCDEFGHIJKLMNOPQRSTUVWXYZ"
4290 low$=" abcdefghijklmnopqrstuvwxyz"
4300 nos$="-.0123456789"
4310 pun$=" !#$%&'()=?/*:+;.,<>"+CHR$34
4320 all$=cap$+low$+nos$+pun$
4330 ENDPROC
4340 :
4350 DEF PROCrect(x,y,l,w,f)
4360 MOVE x,y:DRAW x+l,y
4370 IF f=0 DRAW x+l,y+w ELSE PLOT85,x,
y+w
4380 IF f=0 DRAW x,y+w ELSE PLOT85,x+l,
y+w
4390 MOVE x,y+w:IF f=0 DRAW x,y ELSE MO
VE x,y
4400 ENDPROC
4410 :
4420 DEF PROCdh(t$,x,y)
4430 PRINT TAB(x,y);
4440 LOCAL loop%
4450 FOR loop%=1 TO LEN (t$)
4460 PROCextend("H",ASC(MID$(t$,loop%,1
)))
4470 NEXT
4480 ENDPROC
4490 :
4500 DEF PROCextend(d$,c%)
4510 X%=&70:Y%=0:?X%=c%:A%=10:CALL &FFF
1
4520 IF d$="H" THEN VDU 23,128,X%?1,X%?
1,X%?2,X%?2,X%?3,X%?3,X%?4,X%?4,128,8,10
,23,128,X%?5,X%?5,X%?6,X%?6,X%?7,X%?7,X%
?8,X%?8,128,11:ENDPROC
4530 LOCAL c%,p%,h%,n%,t%
4540 FOR c%=1 TO 5 STEP 4
4550 FOR p%=4 TO 0 STEP -4:VDU 23,128
4560 FOR h%=c% TO c%+3:t%=0
4570 FOR n%=p% TO p%+3:IF (2^n% AND X%?
h%) THEN t%=t%+3*(4^(n%-p%))
4580 NEXT:VDU t%,t%:NEXT:VDU 128:NEXT:V
DU 8,8,10:NEXT:VDU 11,11,9,9
4590 ENDPROC
4600 :
4610 DEF PROCdhdw(t$)
4620 LOCAL loop%
4630 FOR loop%=1 TO LEN (t$)
4640 PROCextend("HW",ASC(MID$(t$,loop%,
1)))
4650 NEXT
4660 ENDPROC
4670 :
4680 DEF PROCdrawbargraf(s,n,mx,mn)
4690 IF max-min=0 THEN PROCmess("Data m
issing for this graph - reselect!"):A$=I
NKEY$(200):ENDPROC
4700 PROCaxis
4710 PROCdobar(section,number,max,min)
4720 ENDPROC
4730 :
4740 DEF PROCdobar(s,n,mx,mn)
4750 COLOUR 2
4760 GCOL 0,2:LOCAL loop%
4770 FOR loop%=0 TO number-1
4780 PROCrect(128+loop%*xscale,64-mn*ys
cale,xscale/2,Q(s,loop%+1)*yscale,1)
4790 NEXT:ENDPROC
4800 :
4810 DEF PROCdrawlinegraf(s,n,mx,mn)
4820 IF mx-mn=0 THEN PROCmess("Data mis
sing for this graph - reselect!"):A$=INK
EY$(200):ENDPROC
4830 PROCaxis
4840 PROCdoline(s,n,mx,mn)
4850 ENDPROC
4860 :
4870 DEF PROCdoline(s,n,mx,mn)
4880 COLOUR 2
4890 GCOL 0,2:LOCAL loop%
4900 MOVE 128,(64-mn*yscale)+Q(s,1)*ysc
ale
4910 FOR loop%=0 TO number-1
4920 DRAW 128+loop%*xscale,(64-mn*yscal
e)+Q(s,loop%+1)*yscale
4930 NEXT:ENDPROC
4940 :
4950 DEF PROCdrawpiechart(s,n,mx,mn)
```

Continued ▶

# FILE TRANSFER

◀ Joe's Jottings, continued

```
 4960 IF mx-mn = 0 THEN PROCmess("Data m
issing for this graph - reselect!"):A$=I
NKEY$(200):ENDPROC
 4970 PROCdopie(s,n,mx,mn)
 4980 ENDPROC
 4990 :
 5000 DEF PROCdopie(s,n,mx,mn)
 5010 RESTORE 5360
 5020 total=FNtotal(s,n)
 5030 LOCAL loop%,angle,lastangle,centre
 5040 centre=320
 5050 lastangle=90
 5060 FOR loop%=1 TO n
 5070 MOVE centre,500:MOVEcentre+290*COS
(RAD(lastangle)),500+290*SIN(RAD(lastang
le))
 5080 angle=lastangle+ABS(Q(s,loop%))*36
0/total
 5090 PROCef(loop%-1)
 5100 PLOT 181,centre+290*COS(RAD(angle)
),500+290*SIN(RAD(angle))
 5110 lastangle=angle
 5120 MOVE 904,(1024-(loop%*3+3)*32)
 5130 MOVE 840,(1024-(loop%*3+5)*32)
 5140 PLOT 85,940,(1024-(loop%*3+5)*32)
 5150 GCOL 0,3
 5160 MOVE 904,(1024-(loop%*3+3)*32)
 5170 DRAW 840,(1024-(loop%*3+5)*32)
 5180 DRAW 940,(1024-(loop%*3+5)*32)
 5190 DRAW 904,(1024-(loop%*3+3)*32)
 5200 VDU 5:PRINT " ";Q$(s,loop%);:VDU 4
 5210 NEXT
 5220 GCOL 0,1
 5230 MOVE centre,500
 5240 PLOT 149,centre,794
 5250 ENDPROC
 5260 :
 5270 DEF PROCef(c)
 5280 IF INT(c/20)*20=c THEN RESTORE 536
0
 5290 LOCAL loop%
 5300 VDU 23
 5310 FOR loop%=0 TO 8
 5320 READ d:VDU d:NEXT
 5330 GCOL 16*(c DIV 4),c MOD 4
 5340 ENDPROC
 5350 :
 5360 DATA 12,0,0,0,0,0,0,0,0
 5370 DATA 12,1,1,1,1,1,1,1,1
 5380 DATA 12,2,2,2,2,2,2,2,2
 5390 DATA 12,3,3,3,3,3,3,3,3
 5400 :
 5410 DATA 12,0,1,0,1,0,1,0,1
 5420 DATA 12,0,2,0,2,0,2,0,2
 5430 DATA 12,0,3,0,3,0,3,0,3
 5440 DATA 12,0,1,1,0,0,1,1,0
 5450 :
 5460 DATA 13,0,2,2,0,0,2,2,0
 5470 DATA 13,0,3,3,0,0,3,3,0
 5480 DATA 13,1,2,1,2,1,2,1,2
 5490 DATA 13,1,3,1,3,1,3,1,3
 5500 :
 5510 DATA 14,1,2,2,1,1,2,2,1
 5520 DATA 14,1,3,3,1,1,3,3,1
 5530 DATA 14,2,3,2,3,2,3,2,3
 5540 DATA 14,2,3,3,2,2,3,3,2
 5550 :
 5560 DATA 15,0,0,1,1,0,0,1,1
 5570 DATA 15,0,0,2,2,0,0,2,2
 5580 DATA 15,0,0,3,3,0,0,3,3
 5590 DATA 15,2,2,1,1,2,2,1,1
 5600 :
 5610 DEF FNtotal(s,n)
 5620 LOCAL total
 5630 total=0
 5640 FOR lp=1 TO n
 5650 total=total+ABS(Q(s,lp))
 5660 NEXT
 5670 =total
 5680 :
 5690 DEF PROCaxis
 5700 GCOL 0,1
 5710 PROCrect(128,64,1024,832,0)
 5720 IF mn>0 THEN mn=0
 5730 yscale=832/(mx-mn)
 5740 FOR y=64 TO 896 STEP 64
 5750 @%=z%:MOVE 1152,y:DRAW 100,y:MOVE
0,y+16
 5760 yval=INT(((y-64)/yscale)*10+.5+mn*
10)/10
 5770 VDU 5
 5780 IF yval<10 AND yval>-10 THEN PRINT
;yval:ELSE PRINT;INT(yval)
 5790 VDU 4:@%=&20209
 5800 NEXT
 5810 GCOL 0,3:MOVE 100,64-mn*yscale:DRA
W 1180,64-mn*yscale:GCOL 0,1
 5820 xscale=1024/number
 5830 FOR x=128 TO 1152 STEP xscale
 5840 GCOL 0,2:COLOUR 2
 5850 tval=((x-128) DIV xscale)+1
 5860 IF tval<=ca THEN @%=z%:MOVE x,48:V
DU 5:PRINT LEFT$(Q$(section,tval),xscale
/32);:VDU 4:@%=&20209
 5870 GCOL 0,1
 5880 MOVE x,48:DRAW x,896
 5890 NEXT
 5900 @%=z%
 5910 GCOL 0,3:COLOUR 3
 5920 ENDPROC
 5930 :
 5940 DEF PROCmess(t$)
 5950 PROCdh(t$,(20-LENt$/2),30)
 5960 ENDPROC
 5970 :
 5980 DEF PROCdumpout(b)
 5990 b=1-b
 6000 PROCdh(STRING$(36," "),2,b*30)
 6010 PROCdh("Setup printer then press R
ETURN.",4,b*30)
 6020 REPEAT UNTIL GET =13
 6030 PROCdh(STRING$(36," "),2,b*30)
 6040 IF b=0 THEN PROCdh(S$(section),20-
(LEN(S$(section))/2),0)
 6050 DIM P%3,Q%3:!P%=&03010000:!Q%=&030
20100:MOVE 0,0:VDU 29,0;0;2,1,27,1,65,1,
8,1,10
 6060 FOR Y%=1020 TO 12 STEP-16:VDU 1,27
,1,76,1,192,1,3:FOR X%=0TO 1276 STEP 4:A
%=0:B%=0:FOR Z%=0 TO 12 STEP 4:C%=POINT(
X%,Y%-Z%):A%=A%*4+P%?C%:B%=B%*4+Q%?C%:NE
XT:VDU 1,A%,1,B%,1,A%:NEXT:VDU 1,10:NEXT
:VDU 1,27,1,64,3:ENDPROC
```

See Psion File Transfer, page 81

```
 10 REM Psion/BBC Transfer
 20 REM by Simon Hewitt
 30 REM for M/C
 40 REM (c) BAU May 1989
 50 :
 60 MODE 129
 70 :
 80 ON ERROR PROCerrors
 90 pfid$="PFE_PSI"
100 memsize%=&FF
110 osfile=&FFDD
120 osgbpb=&FFD1
130 osbyte=&FFF4
140 DIM code% &100,mem% memsize%
150 DIM bfer 20,fname% 20,menu$(4)
160 DIM tim$(2)
170 char=&80
180 state=&81
190 bf=&82
200 emp=&83
210 *FX 229 1
220 *FX 15
```

Continued ▶

# FILE TRANSFER

◀ **Psion File Transfer, continued**

```
230 *FX 2 2
240 *FX 3 0
250 *FX 4 1
260 *FX 7 6
270 *FX 8 6
280 *FX 156 8 227
290 VDU 19,0,4,0,0,0
300 VDU 19,1,0,0,0,0
310 VDU 19,2,6,0,0,0
320 VDU 23,2,240,135,240,45,240,135,24
0,0
330 GCOL 16,128
340 CLG
350 PROCassem
360 :
370 REPEAT
380 RESTORE 3720
390 M%=0
400 S%=FNmenu(M%)
410 IF (S%=nmen%) THEN PROCend:END
420 ON S% PROCimp, PROCexp, PROCstr
430 UNTIL FALSE
440 END
450 :
460 DEF PROCerrors
470 VDU 3
480 ON ERROR PROCend:REPORT:PRINT " at
 line ";ERL:END
490 PROCsb:PRINT TAB(4,1);"AN ERROR HA
S OCCURRED":PROCmb
500 PROCbox(2,12,37,10,1,2,2)
510 VDU 28,4,12,35,11
520 REPORT:PRINT
530 PROCdisp("At line "+STR$(ERL),15)
540 PROCpause(22)
550 PROCend
560 END
570 :
580 DEF PROCend
590 CLOSE#0
600 VDU 26,20,12,23,1,1;0;0;0;
610 *FX 2,0
620 *FX 3,0
630 *FX 4,0
640 *FX 229,0
650 ENDPROC
660 :
670 DEF FNmenu(m%)
680 LOCAL K%,M%,T%,k%
690 READ nmen%
700 FOR M%=1 TO nmen%
710 READ menu$(M%)
720 NEXT
730 T%=-1
740 REPEAT:*FX 21
750 IF T% PROCsb:PRINTTAB(4,1)"PSION D
ATA FILE EDITOR"
760 IF T% PROCmb:PROCcursor(FALSE):IF
(m%>0) COLOUR 2
770 IF T% FOR M%=1 TO nmen%:PRINTTAB(3
,M%*2)menu$(M%):NEXT
780 K%=GET-48:T%=0
790 IF ((K%>0) AND (K%<nmen%+1)) THEN
k%=FNsure(menu$(K%))
800 IF ((K%=-21) AND (m%=0)) THEN k%=0
810 IF ((K%=-21) AND (m%>0)) THEN k%=1
21:K%=nmen%
820 UNTIL (k%=121):=K%
830 :
840 DEF PROCbox(lx%,by%,rx%,ty%,fg%,bg
%,sh%)
850 IF (sh%) THEN VDU 24,lx%*32-10;(32
-by%)*32-10;rx%*32+10;(32-ty%)*32+10;
860 IF (sh%) THEN GCOL sh%*16,128:CLG
870 VDU 17,fg%,17,(128+bg%),28,lx%,by%
,rx%,ty%,12
880 ENDPROC
890 :
900 DEF PROCsb
910 VDU 17,128,17,3,28,6,3,34,1,12
920 ENDPROC
930 :
940 DEF PROCmb
950 VDU 17,128,28,1,30,38,5,12
960 ENDPROC
970 :
980 DEF PROCcursor(on)
990 IF (on) VDU 23,1,1;0;0;0; ELSE VDU
23,1,0;0;0;0;
1000 ENDPROC
1010 :
1020 DEF PROCdisp(d$,y%)
1030 LOCAL x%
1040 x%=INT((36-LEN(d$))/2+.5)
1050 PROCbox(x%+1,y%+2,x%+LEN(d$)+2,y%,
1,2,2)
1060 PRINT TAB(1,1);d$
1070 ENDPROC
1080 :
1090 DEF FNinput(q$,len%,y%)
1100 LOCAL a$,b$,K%,T%,x%
1110 b$=CHR$(127)+"."+CHR$(8)
1120 PROCcursor(TRUE)
1130 PROCdisp(q$,y%)
1140 PROCdisp(STRING$(len%,"."),y%+5)
1150 PRINT TAB(1,1);
1160 REPEAT:*FX 21
1170 K%=GET
1180 T%=((K%=127) AND (LEN(a$)>0))
1190 IF T% THEN a$=LEFT$(a$,LEN(a$)-1):
PRINT b$;
1200 T%=((LEN(a$)<len%) AND (K%>31) AND
(K%<127))
1210 IF T% THEN PRINT CHR$(K%);:a$=a$+C
HR$(K%)
1220 UNTIL ((K%=13) OR (K%=27))
1230 PROCcursor(FALSE)
1240 IF (K%=27) THEN =""
1250 =a$
1260 :
1270 DEF FNgk
1280 *FX 21
1290 =(GET OR 32)
1300 :
1310 DEF PROCpause(y%)
1320 *FX 21
1330 VDU 7
1340 PROCdisp("Press any key",y%)
1350 y%=INKEY(2000)
1360 ENDPROC
1370 :
1380 DEF FNsure(d$)
1390 LOCAL K%
1400 PROCdisp(RIGHT$(d$,LEN(d$)-3)+"?",
27)
1410 K%=FNgk
1420 IF (K%<>121) THEN PROCbox(2,29,38,
26,3,0,0)
1430 =K%
1440 :
1450 DEF PROCinit
1460 LOCAL N%
1470 ?char=0
1480 ?state=0
1490 ?bf=0
1500 FOR N%=0 TO memsize%
```

Continued ▶

# FILE TRANSFER

◀ **Psion File Transfer, continued**

```
 1510 mem%?N%=0
 1520 NEXT
 1530 FOR N%=0 TO 20
 1540 bfer?N%=0
 1550 NEXT
 1560 ENDPROC
 1570 :
 1580 DEF PROCgbpb(S%,N%)
 1590 ?bfer=ch1
 1600 bfer!1=mem%
 1610 bfer!5=S%
 1620 A%=N%
 1630 X%=bfer MOD &100:Y%=bfer DIV &100
 1640 CALL gbpb1
 1650 IF -(?state) THEN PROCmb:PROCdisp(
"Bad block",8):PROCpause(15):PROCend:END
 1660 ENDPROC
 1670 :
 1680 DEF PROCimp
 1690 LOCAL B%,C%,K%,L%,T%,end,xoff,oldx
,F$
 1700 PROCinit
 1710 PROCsb
 1720 PRINT TAB(3,1);"RECEIVE FILE FROM
PSION"
 1730 REPEAT
 1740 B%=0
 1750 PROCmb
 1760 F$=FNinput("Enter the filename for
 storage",10,8)
 1770 T%=(F$<>"")
 1780 IF T% THEN PROCmb:PROCdisp("Attemp
ting to open "+F$,8)
 1790 IF T% THEN B%=FNcheckfile(F$)
 1800 IF (T% AND (B%=0)) THEN PROCdisp("
File exists - overwrite?",12):K%=FNgk
 1810 IF (T% AND (B%=0) AND (K%<>121)) T
HEN B%=3
 1820 IF (T% AND (B%=1)) THEN B%=0
 1830 RTS
 1840 IF (T% AND (B%)) THEN PROCpause(18
)
 1850 UNTIL (B%=0)
 1860 IF (T%=0) THEN ENDPROC
 1870 ch1=OPENOUT(F$)
 1880 B%=1
 1890 *FX 15
 1900 t$=TIME$
 1910 tim$(1)=MID$(t$,5,11)+MID$(t$,17,5
)
 1920 PRINT# ch1,pfid$,tim$(1)
 1930 PROCmb
 1940 PROCdisp("Please start transmissio
n",8)
 1950 bfer!9=27
 1960 REPEAT
 1970 L%=mem%
 1980 REPEAT
 1990 CALL getchar
 2000 T%=((?emp=0) AND (?char<>17))
 2010 IF T% THEN ?L%=?char:C%=C%+?char:L
%=L%+1
 2020 oldx=xoff
 2030 IF (ADVAL(-2)>150) THEN xoff=TRUE
 2040 IF ((ADVAL(-2)<10) OR (?emp=1)) TH
EN xoff=FALSE
 2050 IF (oldx<>xoff) THEN PROConoff(xof
f)
 2060 IF (?char=26) THEN end=TRUE
 2070 UNTIL ((L%=mem%+memsize%) OR (end)
)
 2080 xoff=TRUE
 2090 PROConoff(xoff)
 2100 PROCmb
 2110 PROCdisp("Received block "+STR$(B%
),8)
 2120 PROCgbpb(L%-mem%,1)
 2130 B%=B%+1
 2140 UNTIL (end)
 2150 CLOSE# ch1
 2160 PROCmb
 2170 PROCdisp("File "+F$+" transferred.
",8)
 2180 C%=C% AND &FFFF
 2190 PROCdisp("Checksum is : "+STR$~C%,
12)
 2200 PROCpause(18)
 2210 ENDPROC
 2220 :
 2230 DEF PROConoff(N%)
 2240 LOCAL A%,X%,Y%
 2250 IF N% THEN Y%=19 ELSE Y%=17
 2260 A%=138:X%=2
 2270 ENDPROC
 2280 :
 2290 DEF PROCexp
 2300 LOCAL B%,I%,K%,T%,V%,rem%,F$
 2310 PROCinit
 2320 csum=0
 2330 PROCsb
 2340 PRINT TAB(6,1);"TRANSMIT TO PSION"
 2350 REPEAT
 2360 B%=0
 2370 PROCmb
 2380 F$=FNinput("Enter the filename to
transmit",10,8)
 2390 T%=(F$<>"")
 2400 IF T% THEN PROCmb:PROCdisp("Attemp
ting to open "+F$,8)
 2410 IF T% THEN B%=FNcheckfile(F$)
 2420 IF ((T%) AND (B%=0)) THEN B%=FNche
ckid(F$,pfid$)
 2430 IF ((T%) AND (B%)) THEN PROCpause(
18)
 2440 UNTIL (B%=0)
 2450 IF (T%=0) THEN ENDPROC
 2460 ch1=OPENIN(F$)
 2470 bfer!9=27
 2480 B%=((lng%-27) DIV memsize%)
 2490 rem%=((lng%-27)-(B%*memsize%))
 2500 PROCmb
 2510 PROCdisp("Set PSION to receive now
",8)
 2520 *FX 15
 2530 REPEAT
 2540 CALL getchar:UNTIL ?char=17
 2550 IF B%<>0 THEN PROCtransmit(B%)
 2560 PROCgbpb(rem%,3)
 2570 PROCsend(rem%)
 2580 CLOSE #ch1
 2590 PROCmb
 2600 PROCdisp("File "+F$+" transferred.
",8)
 2610 csum=csum AND &FFFF
 2620 PROCdisp("Checksum is : "+STR$~csu
m,12)
 2630 PROCpause(18)
 2640 ENDPROC
 2650 :
 2660 DEF PROCtransmit(b%)
 2670 LOCAL N%
 2680 FOR N%=1 TO b%
 2690 PROCgbpb(memsize%,3)
 2700 PROCsend(memsize%)
 2710 PROCmb
```

Continued ▶

# FILE TRANSFER

◀ **Psion File Transfer, continued**

```
2720 PROCdisp("Block "+STR$(N%)+" trans
ferred",8)
2730 NEXT
2740 ENDPROC
2750 :
2760 DEF PROCsend(N%)
2770 IF N%=0 ENDPROC
2780 FOR I%=mem% TO mem%+N%-1
2790 CALL ob
2800 IF ?bf<80 THEN REPEAT:CALL ob:UNTI
L ?bf>180
2810 csum=csum+?I%:A%=138:X%=2:Y%=?I%
2820 CALL osbyte
2830 NEXT
2840 ENDPROC
2850 :
2860 DEF FNcheckfile(F$)
2870 LOCAL Z%,ans%
2880 $fname%=F$
2890 ?bfer=fname% MOD 256:bfer?1=fname%
DIV 256
2900 X%=bfer MOD 256:Y%=bfer DIV 256
2910 A%=5:Z%=(USR(osfile) AND &FF)
2920 IF (Z%=0) THEN PROCdisp("File is n
ot on current directory",12):=1
2930 IF (Z%=2) THEN PROCdisp("That's a
directory, not a file!",12):=2
2940 IF (Z%=&FF) THEN PROCdisp("That fi
le is protected",12):=3
2950 lng%=bfer!10:att%=bfer!14
2960 IF ((att% AND 8)=8) THEN PROCdisp(
"The file is locked",12):=4
2970 IF ((att% AND 1)<>1) THEN PROCdisp
("No READ access",12):=5
2980 IF ((att% AND 2)<>2) THEN PROCdisp
("No WRITE access",12):=6
2990 =0
3000 :
3010 DEF FNcheckid(F$,id$)
3020 LOCAL C%,ch,fid$
3030 ch=OPENIN(F$)
3040 PTR# ch=8
3050 FOR C%=1 TO 7
3060 fid$=fid$+CHR$(BGET# ch)
3070 PTR# ch=PTR# ch-2
3080 NEXT
3090 CLOSE#ch
3100 IF (fid$=id$) THEN =0
3110 PROCdisp("File does not contain id
entifier",12)
3120 =8
3130 :
3140 DEF PROCstr
3150 LOCAL S$,K%,T%
3160 ON ERROR PROCend:REPORT:PRINT " at
line ";ERL:END
3170 PROCsb
3180 PRINT TAB(5,1);"PERFORM STAR COMMA
ND"
3190 PROCmb
3200 S$=FNinput("Please enter the comma
nd",20,8)
3210 IF S$="" THEN ENDPROC
3220 IF (LEFT$(S$,1)="*") THEN S$=RIGHT
$(S$,LEN(S$)-1)
3230 T%=((LEFT$(S$,3)="COM") OR (LEFT$(
S$,4)="FORM") OR (LEFT$(S$,3)="BAC"))
3240 IF T% THEN PROCmb:PROCdisp("I can'
t let you do that!",8)
3250 IF T% THEN PROCpause(12):ENDPROC
3260 VDU 17,3,17,129,26,12,14
3270 PRINT S$
3280 OSCLI(S$)
3290 PRINT''TAB(13);"Press any key"
3300 *FX 21
3310 K%=GET
3320 GCOL 16,128
3330 VDU 16,15
3340 ON ERROR PROCerrors
3350 ENDPROC
3360 :
3370 DEF PROCassem
3380 FOR pass=0 TO 2 STEP 2:P%=code%
3390 [OPT pass
3400 .getchar
3410 LDA #0
3420 STA emp
3430 LDA #145
3440 LDX #1
3450 JSR osbyte
3460 BCS empty
3470 STY char
3480 RTS
3490 .empty
3500 LDY #1
3510 STY emp
3520 RTS
3530 .gbpb1
3540 JSR osgbpb
3550 BCS bad
3560 LDA #0
3570 JMP return
3580 .bad
3590 LDA #1
3600 .return
3610 STA state
3620 .ob
3630 LDA #128
3640 LDX #253
3650 LDY #255
3660 JSR osbyte
3670 STX bf
3680 RTS
3690 ]:NEXT
3700 ENDPROC
3710 :
3720 DATA 4
3730 DATA "1. Import a file"
3740 DATA "2. Export a file"
3750 DATA "3. Perform a Star command"
3760 DATA "4. Exit the program"
```

*The version of the* Psion File Transfer *program printed here has been cut down from the original, to fit in the yellow pages. It can transfer files to and from the Psion, in order to backup your Psion data. But only the full version has the editing facilities described in the article, such as adding new records to the data.*

*The full version is on the monthly disc, of course, or you can get a paper printout be sending a large s.a.e. marked 'Psion File Transfer' to* BBC Acorn User, *Redwood Publishing, 20-26 Brunswick Place, London, N1 6DJ.*

# ORDER FORM

## 5.25-INCH DISC SUBSCRIPTIONS

Yes! Please start my 5.25-inch disc subscription with the ______ issue.
See page 65 for details

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| ☐ APR 0231-3 | ☐ OCT 0237-2 | ☐ APR 0243-7 |
| ☐ MAY 0232-1 | ☐ NOV 0238-0 | ☐ MAY 0244-5 |
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| ☐ NOVEMBER | 0504-5 | ☐ APRIL | 0509-6 |
| ☐ DECEMBER | 0505-3 | ☐ MAY | 0510-X |

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## MAGAZINE SUBSCRIPTIONS

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| ☐ JUN 0049-3 | ☐ JUN 0061-2 | |
| ☐ JUL 0050-7 | ☐ JUL 0062-0 | |
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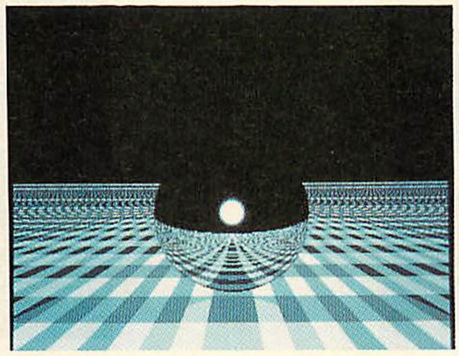
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# OFFERS

## THIS MONTH'S LISTINGS

Joe's Jottings for May is a Market Survey program which lets you come up with the questions to put to friends and foe. Once answered you can correlate and print out the answers.



Ray tracing is a great 3-D solid modelling program. There is also a Psion transfer program for Psion to BBC, this is an enhanced version of the magazine program. The Hints and Tips for May are a mode 7 plotting routine which allows you to use existing move draw and plot commands in mode 7; a line editor; a utility to use sideways RAM for user defined character workspace and a program for the Electron to enhance function key use.

Agora has a boot! file creator and a key strip editor for the Master, Master Compact and Archimedes and the May disc also includes the updated Archimedes floating point routines to incorporate constants in ARM assembler.

### Ray tracing for everyone

## GAMES DISC

Ten of the best *Acorn User* games on one 80-track double-sided 5.25-inch disc.

Whether you're into arcade or adventure type games this new disc has something for everyone. The games included are *Warlord, Wizalon, Castle of Nightmares, Run Silent, Run Deep, Polyominoes* and *Quadline*. We have also included three of the most popular one-line games from recent Abusers. Test your knowledge with *Mastermind* and start playing *Varpon* and *Lurch* to win.

Make sure you get your disc of fun and entertainment and send off for the Games disc today. At only £8.95 it will make the perfect gift.

### Games galore for just £8.95




## '87 COMPILATION DISC

*Acorn User* has put all your favourite programs, routines and utilities from 1987 on one disc.



Featured are: Kiddie Art; Tapestry; PCB by CAD; Autumn and Theme, our music programs from April '87. Also featuring on the disc is Joe Telford's GEM-like front end for the Master including a desktop calendar and year planner.

Other useful utilities include a proportional screen dump, a *View* printer driver generator, a monitor-testing routine and a routine for printing spreadsheets sideways.

The second half of the disc is devoted to graphics, with a video image enhancer and six of the best Graphics Bonuses.

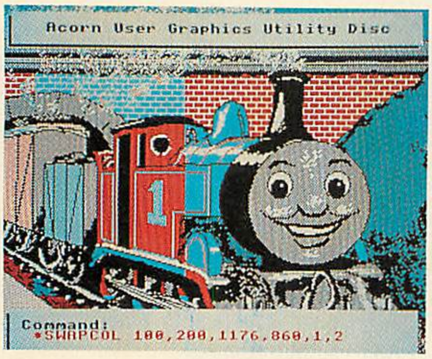
The *Acorn User* '87 Compilation disc comes in 5.25-inch 80-track format, with a comprehensive manual which includes all function key strips and instructions needed for the programs.

### All the very best of '87 on one disc

**ORDER BY TELEPHONE (0672) 40825**

# OFFERS

## SOFTWARE & GRAPHICS




## Great graphics utilities

The 40-track 5.25-inch *Graphics Utilities* disc which is keenly priced at £7.95, features not only 16 stand-alone machine code utilities, an advanced teletext editor and several useful Basic procedures, it also has an easy-to-adapt disc header and index.

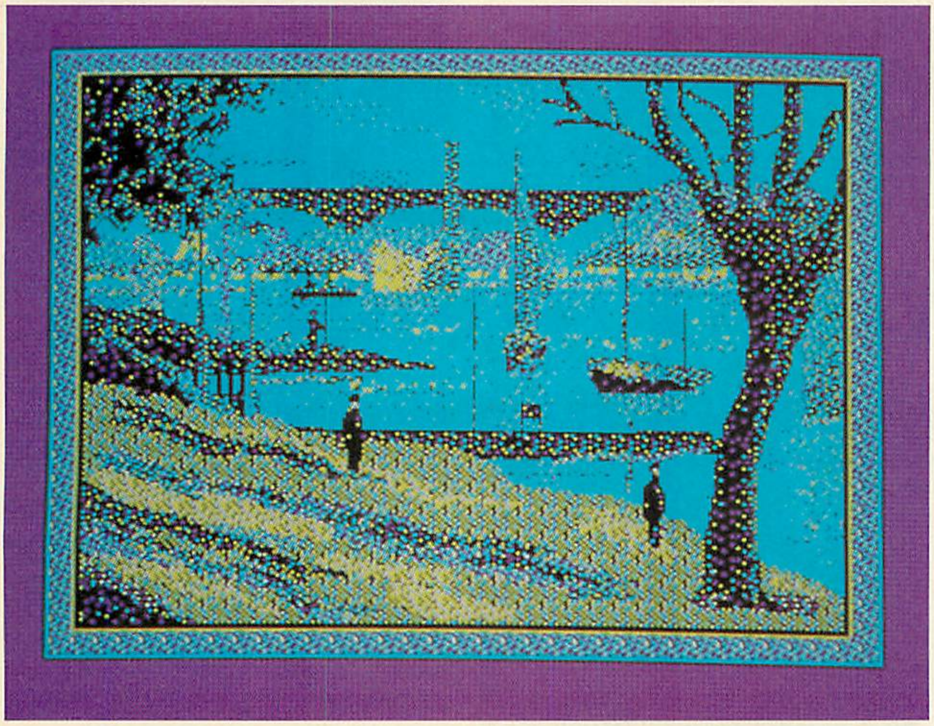
Included are: *Rotate, rotates area through 180 degrees; *SwapCol, swaps two colours; *ColFill, a colour-fill routine; *SvPic, saves a compacted picture; *LdPic, reloads a compacted picture. There are also many utilities to manipulate graphics.




## Sideways RAM made simple

The *Acorn User* sideways RAM disc gives you many more utilities for your sideways RAM. These include: RAMpad – your computer's answer to the pad and pen; six different on-screen fonts available in all modes; a 15k printer buffer; Screen Swap – store and recall mode 4 or 5 screens; *RomHead – standard service ROM header; *RLook – allows you to examine sideways RAM or ROM.

There are many more utilities on this 40/80-track 5.25-inch disc and it's a snip at £9.95.



## Micro masterpieces on Portfolio for £9.95

Jonathan Inglis, freelance illustrator, has assembled a *Portfolio* of his best work exclusively for *BBC Acorn User.*

The disc contains screens that have been used by national and regional publications. Included are Seurat's *Bathers,* a *Time Out* cover from August 1985, and two familiar *Acorn User* covers, Willow (Nov '86) and Magician (Jan '86), as well as several pictures commissioned by *The Times.*

Three of Jonathan's favourite masterpieces are on the disc; Seurat's *Riverside,* Vermeer's *Lady at the Virginal* and a copy of a famous lithograph by Matisse. Sade fans will probably be more interested in the two stunning portraits of the singer included on the disc.

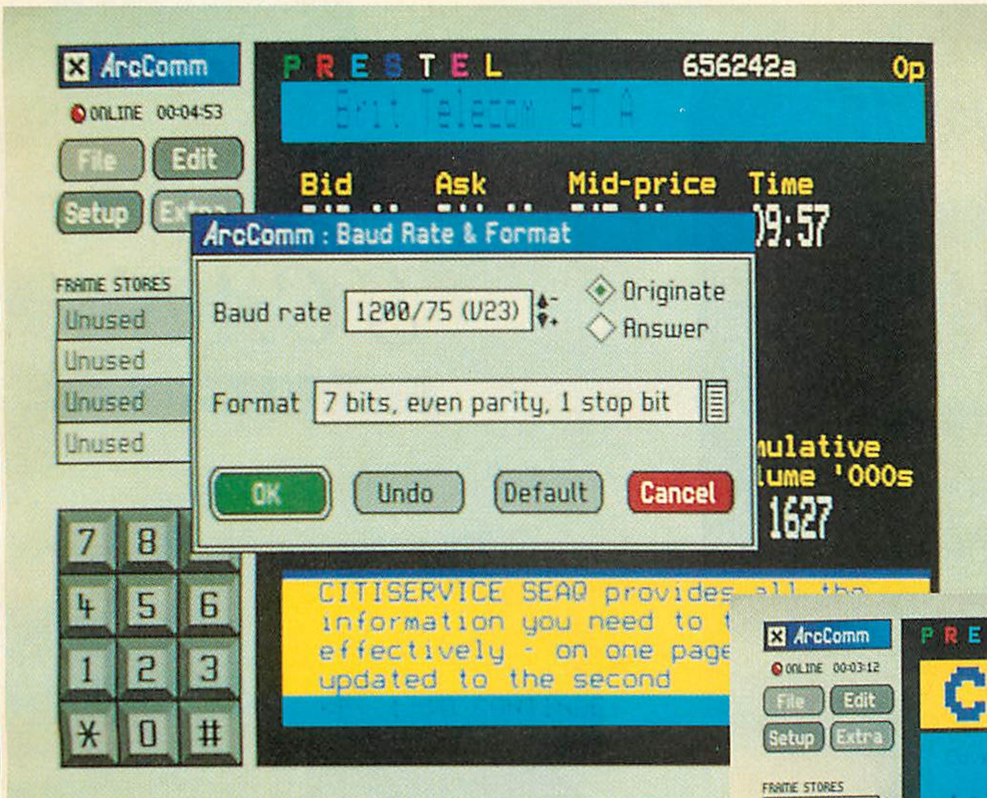
You can create your own pièce de résistance using the *Pixel Editor* and *Super Painter* programs. *Pixel Editor* allows you to draw in and alter minute detail, while *Super Painter* enables you to draw lines, texture your screen and shade by mixing the eight standard colours.

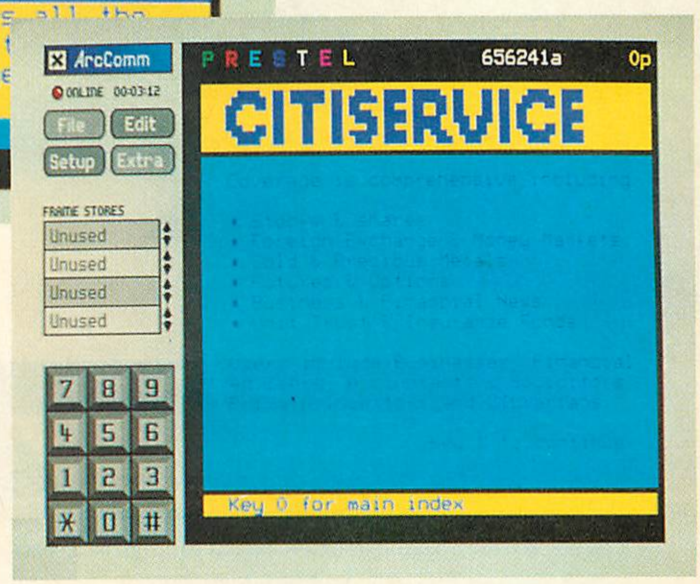
*Portfolio* comes in 80-track 5.25-inch format with a comprehensive instruction sheet telling you about the pictures and how the artist created them. This disc can be yours for only £9.95.

**TO ORDER USE THE FORM ON PAGE 114**

# OFFERS

## ARC COMM




Taking full advantage of the Risc OS, *ArcComm* is a unique new communications package for the Archimedes.

*ArcComm's* comprehensive design boasts access to all three European viewdata standards, (Prestel, Teletel and Bildschirmtext), together with ANSI colour, VT52 and VT102 scrolling terminals. Both Prestel and Bildschirmtext support Vasscom error correction, and the VT102 terminal offers 132 columns, and smooth scrolling. Full coverage of international character sets is included.

The package has been produced with ease of use as a priority. All screen displays are clear and uncluttered, with pop-up menus and dialogue boxes making control as simple as possible.

You won't have to remember strings of numbers! It's telephone number list allows you to dial and log-on automatically. You can store viewdata frames while on line, edit and upload mailboxes, and load/save frames or screens onto disc.

While communicating, it makes use of the full screen, rather than running in a desktop window. But you can return to the desktop at any time, and *ArcComm* remains running as an icon on the icon bar. You can use other desktop software while *ArcComm* stays on-line but inactive. And clicking on the icon brings back full-screen communication.

You can automate the log-on sequence for any comms service, by using *ArcComm's* own procedure language. This allows you to log-on, set up the correct terminal emulation and all your preferences through a single menu selection.

*ArcComm* supports Hayes, DTI and manual modems, with details of how to write drivers for other modems in the User Guide provided. You will need Risc OS to use the package, and 1 Mbyte or more of memory. The package costs £29.95.

## Communicate with RiscOS!

Please send me ________ copies of *ArcComm* at £29.95

I enclose my cheque/postal order for £________

made payable to **BBC Enterprises Ltd**

NAME ________

ADDRESS ________

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Send this coupon with your cheque to **ArcComm Offer, BBC Acorn User, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.**

# S·C·A·N LIGHT

**The scanner, interface & software for the Archimedes**




## The Hardware

**Scan-Light is based around the scanner interface used for FAX-PACK and provides a low cost way to input high quality scanned or 'digitised' text and pictures into the Archimedes.**

Scan-Light consists of a half-width expansion board (that will fit into any Archimedes), on board ROM software and an 8.5 inch 200 dpi scanner.

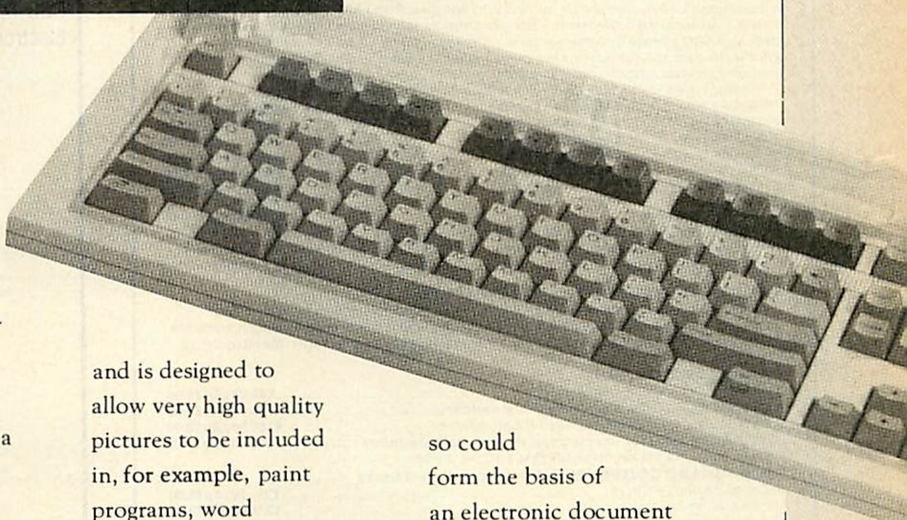
The hand-held scanner will scan pictures or text from loose pages, photographs and books, and because of its full A4 width it will scan complete A4 pages of text or pictures up to 8.5 by 11.5 inches in size. As such, it is far more flexible and useful than other 'half- width' scanners. The scanner also has a brightness control to cater for a range of document contrasts.

Scanning a picture is simple; the scanner is placed at the top of the picture, a menu option is chosen and the scanner is just rolled over the page. The scanner interface ensures the picture is scanned accurately at 200 dots per inch, irrespective of the scan speed.

Completely compatible with Arthur and the new RISCOS operating systems. It can, for example, run on the RISCOS desktop, where it can create files for direct use in the RISCOS paint or draw programs. These programs would allow the pictures to be edited or altered in an infinite number of ways.

*28 days 'no quibble' money back guarantee, in addition to the normal 1 year parts/labour guarantee and free software update service.*

## The Software

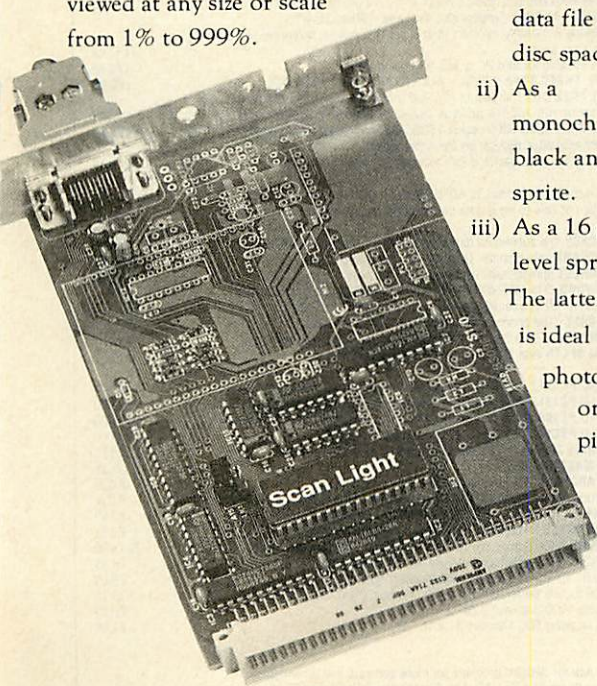


All the necessary scanner controlling software is included on a ROM as part of the scanner interface — it does not require a disc.

The software is WIMP based which makes it very easy to use, with all features being controlled by menu options. These features include:

- The currently scanned page is viewed within a window, which can be scrolled and re-sized like all windows.
- It is possible to 'zoom in' or 'zoom out' so the scanned image may be viewed at any size or scale from 1% to 999%.
- Pixel editing facilities allow individual 200 dpi pixels to be drawn or 'undrawn'.
- Printer drivers are included to print the image to a variety of dot-matrix, inkjet and laser printers.
- The scan can be either a monochrome scan (best for text) or a 'half-tone' scan (best for pictures).
- The image may be viewed either as a monochrome, or 16 grey level picture.
- The whole image, or any selected part, may be saved in a variety of ways:
  - i) As a compressed data file (saves disc space).
  - ii) As a monochrome black and white sprite.
  - iii) As a 16 grey-level sprite.

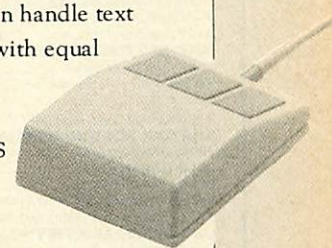
  The latter option is ideal for photographs or pictures




and is designed to allow very high quality pictures to be included in, for example, paint programs, word processors or DTP programs.

Scan-Light is equally suited to capturing photographs from magazines, diagrams or printed text from books, or hand written notes or signatures. An entire A4 page can be scanned into the computer and then filed away on disc to be recalled later (so it can be viewed, subsequently edited or re-printed) and so could form the basis of an electronic document archiving system. It could also be used to build libraries of pictures or diagrams for future reference.

Scan-Light, in conjunction with the outstanding graphics facilities available on the Archimedes, finally takes computers away from their text only backgrounds, into a world where they can handle text and pictures with equal ease.



Hardware and Software runs on Arthur and RISCOS operating systems, requires 1 MByte machine.

*Price £449.00 + VAT for scanner, interface board & software.*

**Computer Concepts Ltd**

Gaddesden Place, Hemel Hempstead, Herts HP2 6EX
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Access & Barclaycard welcome.

# REVIEWS

## THE GAMES PAGE

# ALL DIMENSIONAL

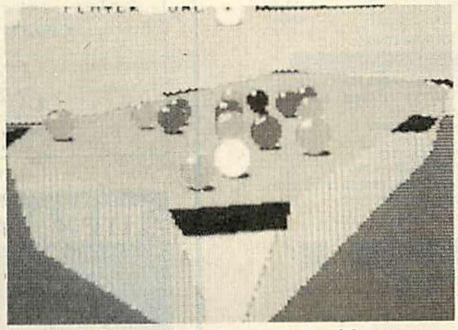
**Once again, Sam Greenhill checks out the games scene and finds that 3D is making a regular appearance**

Things are warming up for the summer games rush, so instead of allowing your body to overheat in the abundant British spring sunshine, you can make your Acorn machine overheat with strenuous playing activity. Playing what? Read on.

The latest news from Godax is still *Bolo*, the multi-user tank game for the BBC, Archimedes and other computers such as the Atari ST and Amiga. But there's a problem. Over a period of six months, I've been trying to get hold of a review copy but whenever I ring, *Bolo* will be 'sent soon'. Now nobody believes the editor when he insists he saw the game in motion in Cambridge six months ago. The real problem may be that the game was written on a model B, and it's difficult to convert to a Master or maybe it's just that Maynard hasn't worked out how to sell a game which needs at least four computers to make it fun.

Positive news this month from Minerva which has churned out another Archie game, *Ibix the Viking*. Amid confusion over the target age for many of its games, Minerva has packaged *Ibix* complete with both junior and adult versions to suit all and silence grumbling reviewers. The object of the exercise comes as standard fare to the self-respecting games player – it's basically a case of arcade-adventuring through nine levels. You control *Ibix* across bridges and into caves, the ultimate objective being to kiss 'the girl'. I haven't seen the game but from what I know, it appears to have an element of sexism involved, unlike the 'right-on' Minerva.

A first for Minerva is the inclusion of a screen designer program with this game. The sprites themselves are not definable, but the authors have provided over 200 predefined designs for you to use, so there shouldn't be any problems



**3D Pool: Some trick shots come with game**

in creating any sort of level you can dream up.

William Hadden of County Down, Northern Ireland has sent me a number of pokes for Impact Software's *Zenon*. I can't list them all but here are the more useful ones. Before starting, make sure you have a blank disc handy, and that the *Zenon* disc is write-protected. Then insert the original disc and load in the main code by typing *Load MC. Then type ?&1182=01 to end the game after the first screen, ?&2320=&EA: ?&2321=&EA for invulnerability, ?&13A7=&FF for lots of lives, or ?&206F=&FF for extended invulnerability.

Finally insert the blank disc, and type *Save MC 1100 +2740. To run the game cheats, load in the 'Start' program on the original disc and type in the lines:

```
177 PRINT TAB (1,30); "Insert Cheat Disc"
178 REPEAT: UNTIL INKEY -99
```

then run this and swap the discs when instructed.

Rob Miller has finally upgraded the poke for Grandslam's Archimedes game *Terramex* into an 'official' method for gaining infinite lives. When you find yourself on the screen where you select a character, type SubjectToChange, and the message 'Cheat Mode On' should appear at the top of the screen.

I have discovered that Impact's *Quazer* is a lot easier to play if you get someone (or a blob of BluTack) to hold down the P key while playing. This makes the computer pause and unpause very quickly, which has the effect of slowing the action down considerably.

It is a relatively simple matter to access the higher levels with this method, so here are the passwords, as sent in by Daniel Tiplady of Newport Pagnell: Blue-Isle, Speaker, Light, Mercedes, Physics, Kojak, Electron, Plant, Barbour, Pizza, and Rower. Daniel also claims to have a high score in *Pacmania* of 381,680 on level 19, but he provides no proof of this. Anyone got higher?

Tynesoft has finally released *Circus Games*, and so now move from the Big Top to the Wild West. In a few months, we can expect to see knife throwing, bottle shooting, and bronco riding, all under the name of *Rodeo Games*. It's another conversion from the New York company Subway Software. The 3D pinball game mentioned last month is also developing fast, with half the screen devoted to an overhead view of the table and the other half to a 3D view a few inches behind the ball. Perhaps this could even be a rival to Rainbird's *3D Pool*, which was revealed last month. Look out for the full review soon.

We still have a large supply of *Starquake* maps by Lance To of New Zealand. For a copy, send a stamped addressed envelope to the address below, enclosing a cheque or postal order for £1 made out to Redwood Publishing.

Lastly, many readers would like to read about those cheats and high scores that you just spent last night on. Send all such material to The Games Page, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.

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# GAMES

## CLOSE IN AND ATTANK




**Tank Attack; CDS, BBC/Electron cassette £12.99, 5.25-inch disc £14.99**

*Tank Attack* is a strategic battle game from CDS Software based on a war between four countries. It's based on the beloved hexagon board wargames, but with a computer as dice and mediator. Two, three or four can play. The absence of a one player option is what we expect from CDS Software after selling 70,000 copies of *Brian Clough's Football Fortunes*.

The object of the game is to capture your enemy headquarters, which isn't easy since your enemy is trying to capture yours as well. During the game you get reports on the weather and news on how well the war is going from a 'newspaper' on the computer screen. But after a while you get to know all the reports and what to expect from the weather. Tanks have three different strengths, light tanks, medium battle tanks and main battle tanks. And you have two types of armoured car. These make up your battle force which includes two repair depots and one rebuilding yard shared between two allies.

The game is played out on the attractive map-board with little plastic tanks. The computer's role is to decide how far you can move each vehicle, how well you shoot and so on. The strategy's quite important, as there's always the odd random factor thrown in by the weather and so on.

This game will certainly appeal to the chess player or wargamer, rather than space mad, zap'em boys or karate freaks. But the game can drag on, leaving you eager to get it over with. If you have the time and a willing friend, it's not a bad buy. But if you like action packed thrills and spills or shooting innocent civilians, it's not for you.

**Mark Swaby**

## SUPERMAN'S PLAYING CIRCUS GAMES



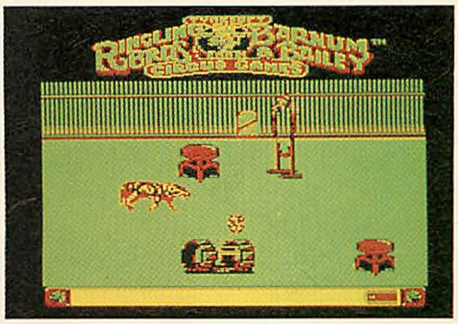
**Superman and Circus Games; Tynesoft, BBC/Electron cassettes £9.95, 5.25-inch discs and 3.5-inch discs £14.95. Prices are for each game**

Since October 1988, David Crofts of Tynesoft has promised these two games 'in two weeks'. Now I've finally got a copy of each – so linked in my mind that I almost think of them as one game, hence the double review.

In *Superman*, you must guide the man of steel through several missions each prefixed by a page from a comic book, with speech bubbles outlining the task ahead. Each mission permits certain superpowers to be used, and in the first flight, infra-red vision, super punch and super breath are all available. The object is to battle through 'parademons' to meet 'the professor'. From there the superhero must rescue Lois Lane and Governor Lee from the terrorist-stricken Atlantis, anchored in Metropolis Harbour. Numerous nasties oppose you, but you can shoot a flashing ball of fire at them and sooner or later they disintegrate.

Other missions involve guiding a space shuttle through an asteroid belt, persuading a bunch of mutant robots that your intentions are honourable (by shooting them), protecting a satellite from an asteroid field, and finally destroying the UFS (unidentified flying satellite) by corrupting the geo-distruptor.

The graphics aren't the best I've seen, but are perfectly reasonable in portraying Superman as he flies. And there's something else I liked – the viewpoint is different for most missions, and I found the tasks themselves varied enough to keep me interested.



Tiger taming is the first event in the Big Top simulation, *Circus Games*. It seems bizarre but it's really quite simple. By keeping yourself in front of the stalking tiger, you can alter its direction just by the crack of a whip.

Loading the game is a lengthy process because Tynesoft insists on flashy loading screens – all very nice, but once you've seen it you don't want to have to view it each and every time you load the game.

However, apart from this, the game has little to disfigure it. The events are good fun, and the graphics well drawn. An oddity, and an improvement if I may say so, is that author Gary James has managed to find alternative methods of controlling the artistes. Most of the events involve performing somersaults or hand-stands while simultaneously balancing, for example on the back of a horse or across a tightrope. Real dexterity is needed with the keys.

*Circus Games* provides the facility to 'save' the actions just made. This is really useful if you want to prove to the person who wasn't watching when they should have been, that you really are capable of completing a certain event.

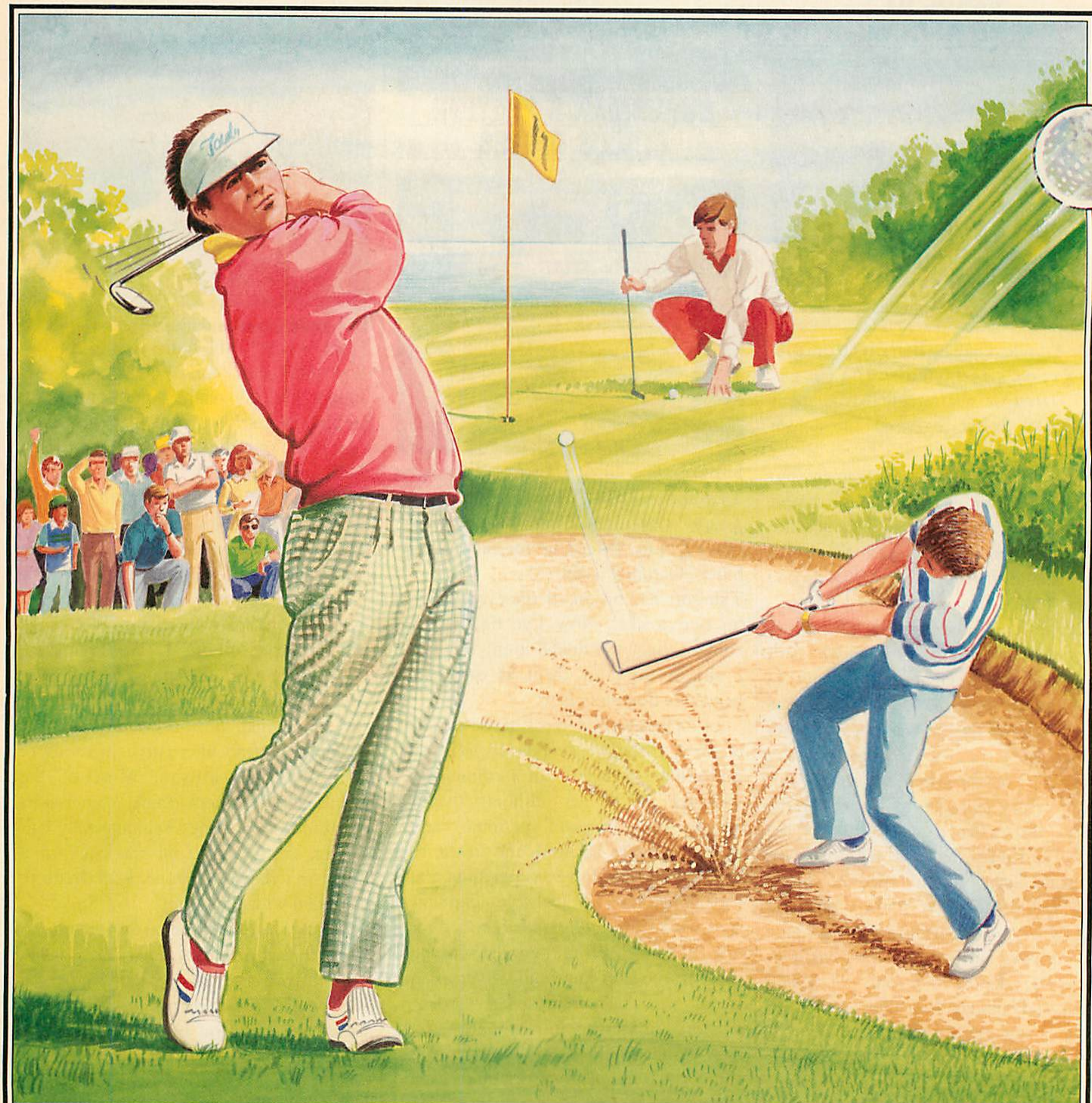
The final event combines all the skills learned in the previous four. Entitled International Competition it invokes you and up to three other players to battle it out for the trophy.

*Circus Games* is definitely among the best from the Tynesoft simulation department, and probably worth buying. Both games have their pros and cons, but overall the balance just swings towards the red seal. Tick, VG.

**Sam Greenhill**

BBC MICRO
ACORN ELECTRON
ARCHIMEDES

# Holed

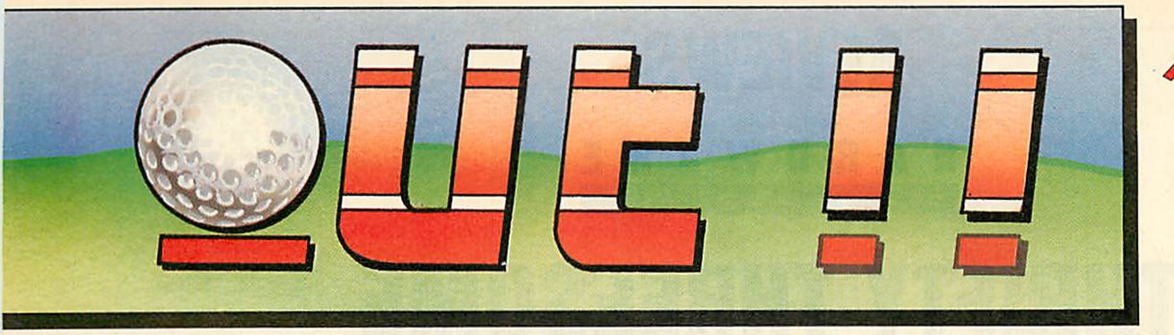


The Fourth Dimension

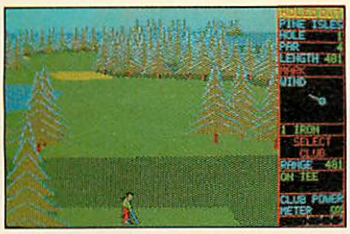
## IDEAL FOR THE BEGINNER OR THE PROFESSIONAL

Whether you're young or old, male or female, beginner or professional, Holed Out has been designed especially for you. You can play alone or use the varying skill levels to allow up to 4 players of differing abilities to be more equally matched against each other. The game controls have been carefully selected for simplicity so that even the youngest or inexperienced computer user can play Holed Out.

Included with the game is a well thought-out instruction manual giving all the information you will require and individual maps of all the 36 holes.



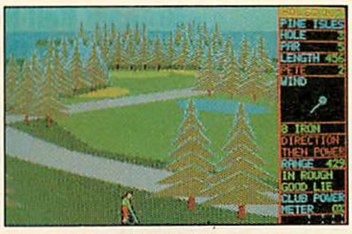
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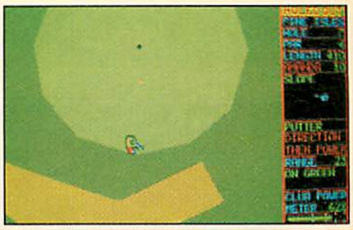
Driving off the 1st tee - a dogleg to the right.



Using a 7 Iron to clear the trees.



A good lie in the rough but there's a strong wind.



A long put with a tricky slope to the left.



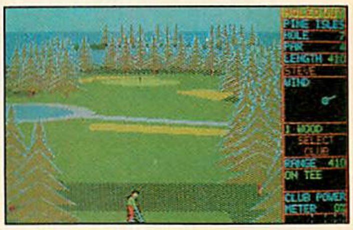
A long bunker shot soars through the air to the green.



A left-handed player aims to clear the canal with a 3 Wood.



A high Wedge shot from a bad lie in the rough.



The Electron version is identical to the BBC version.

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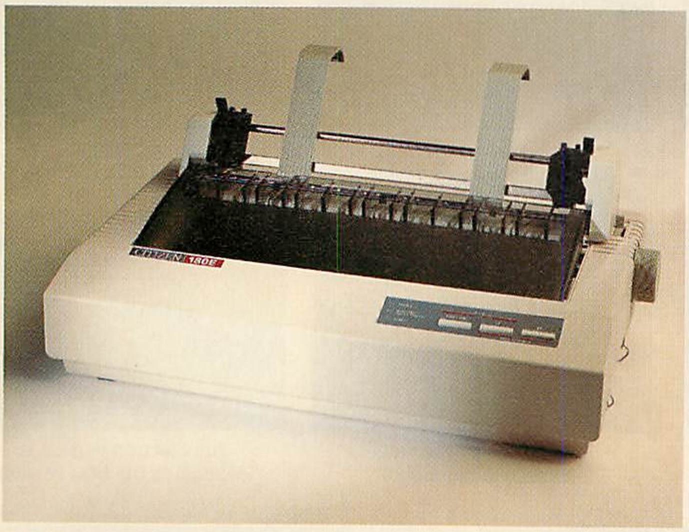
**The Fourth Dimension, P.O. Box 4444, Sheffield. Telephone (0742) 700661.**

The Fourth Dimension

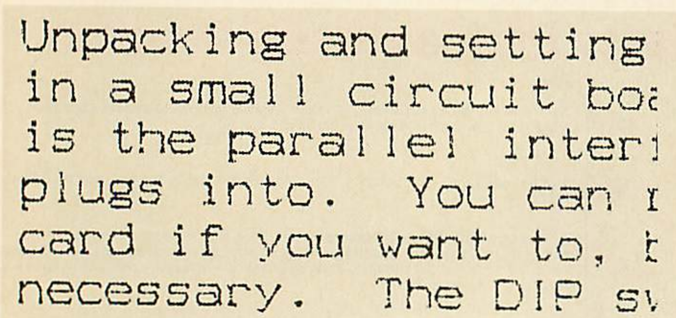
HARDWARE

# THRIFTY THREESOME

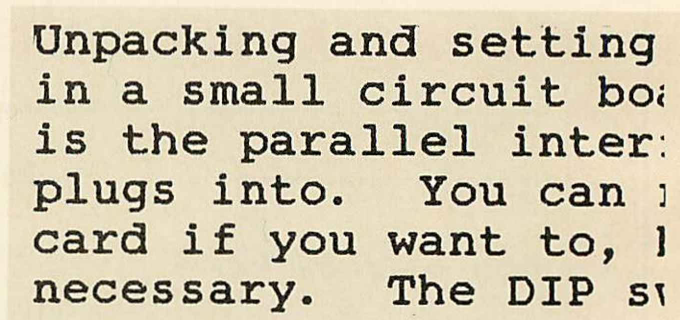
**Graham Bell looks at printing on the cheap with three sub-£200 models**








Citizen 180E: not up to scratch




Mannesmann Tally MT81: good for the price

Recent reviews in *BBC Acorn User* have concentrated on the newer types of printer – particularly 24-pin dot-matrix machines. But if you can't afford these high-quality but expensive printers, there's still a vast range at the value-for-money end of the market. Last year, people were predicting the end of the 9-pin printer, but in fact, several new models have emerged at the cheaper end of the range.

Three of the more recent to emerge are the Mannesmann Tally MT81, the Citizen 180-E and the Panasonic KX-P1180. They vary in price from £150 to £200, but with printers it's always worth shopping around – you may get an even better deal.

Each of these is a traditional 9-pin dot-matrix printer, offering both Epson FX and IBM Proprinter emulations. They all have one or more near letter quality fonts too, for printing your letters. How do they fare?

## Citizen 180E

The Citizen 180E is by far the smallest of the three printers. It feels light and not too robust compared with the others, but its design is based on the established Citizen 120D – a printer which has certainly stood the test of time in many homes.

Unpacking and setting it up is simple. You have to plug in a small circuit board card on the right-hand side; this is the parallel interface that the cable from the computer plugs into. You can replace the interface with a serial card if you want to but with a BBC micro this isn't necessary. The DIP switches are on the card, so you can set them with a biro top before you plug it in. The tractor feed unit clips (not too firmly) on the top of the body.

In use, the printer seems quite slow. Citizen claims it runs at 150 characters per second; this isn't achieved in practice, because like all such figures, it doesn't take any account of the time taken to move between the lines of text. To give a better impression of the speed and a comparison with the Panasonic and Mannesmann Tally models, a real single-page letter was printed out in 72 seconds, in NLQ mode.

There are two fonts. You can switch fonts and set NLQ mode with the front panel switches – the instructions are fairly clear on this and the printer beeps once for font one and twice for font two. There isn't much you can do wrong. But the quality of the fonts is not high. The

NLQ font looks a bit too angular, and the draft quality really has to be printed in bold to get rid of the worst of the 'dotty' look.

Software compatibility is good. It claims to be 'Epson-compatible', and with all the software I tested it with, there seems to be no reason to doubt that. The standard *View* Epson printer driver works first time, and there was no trouble with screendump programs like the *Acorn User UserDump* or ESM's *Screenprint* either.

All in all, the Citizen 180E offers you reasonable value, but I'd prefer a machine with a better NLQ font for printing my letters and documents.

## Mannesmann Tally MT81

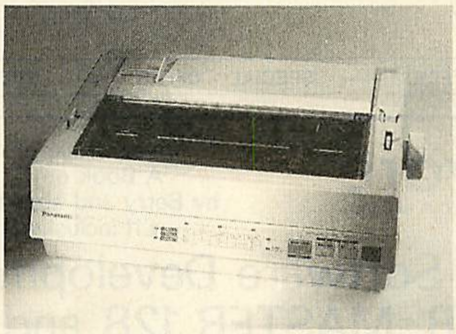
The MT81 is an attractive, almost featureless, streamlined grey box – nothing sticks out except a couple of tiny levers and knobs. Unlike the Citizen, the tractor feed is concealed within the rear of the case, and you can feed paper in through a slot on the back.

Looking inside, there's a lot of cheap-looking plastic gears and a crude paper detector; it looks as though a bit of money has been saved on build-quality. The badge on the front hadn't even been stuck on straight. There's also no adjustment lever to alter the gap between the print head and the paper roller – and that can be vital if you're printing on paper of varying thickness.

But in practice, it works pretty well, even if it is a tad slower than the 180E. It's quieter too, and there's a 'mute' mode you can switch into with the front panel switches. The test letter was completed in 78 seconds, in a very acceptable NLQ font. The quality of the print seems to be helped by having square pins in the print head instead of normal round ones – like the 1984-vintage Shinwa CP80A had. It's also helped a bit on the review machine by having a carbon ribbon, but I tested a normal fabric ribbon too. There were no difficulties with Epson compatibility. One really annoying problem is that I had to open the front cover a lot, simply because it isn't transparent. You can't see where the top of the paper is!

The three switches on the front panel have no less than 24 different functions. Normal things are quite straightforward – there's a single button for NLQ, for example – but you can also select things like double height print by pressing the NLQ plus On Line buttons, then six presses of NLQ, then On Line. These sequences aren't easy to remember. There's no indication on the front panel, and you'd have to be determined to get out the manual. A quick reference card would be a good idea. One of the sequences is for paper parking, that is winding continuous paper half-way out the back of the machine. You can then feed in single sheets of A4 for printing a few letters, and wind the continuous paper back in when you've finished. The Mannesman Tally goes only half way – it winds the paper out for you, but you have to wind it back in by hand.

Overall, the MT81 is a fairly neat printer for the money. The print quality is good, although there's only one font. There are no problems with compatibility, and at about £150, it's not expensive. But a transparent cover would be better. Conclusion – very good value.



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necessary.  The DIP s
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**Panasonic KX-P1180: excellent value**

## Panasonic KX-P1180

Like its bigger brother, the KX-P1134 which was reviewed in *BBC Acorn User* in January 1989, this machine seems big and chunky. It feels much more substantial than the other two. I like the way it looks, but it's much heavier than the MT81 or 180E, and needs nearly half as much desk space again.

Setting it up is easy; like the Mannesman Tally, the DIP switches are under the ribbon and are easy to get at. Switching to Epson emulation, no automatic line feed, no perforation skip, 8-bit data and the US character set takes only seconds. It connects to the computer via the usual cable, and away you go.

The printer has two different ways of feeding in paper. You can feed it from the bottom, in which case the tractor unit pulls it through the printer. Or you can feed it from behind, in which case it pushes the paper. The push-feed arrangement is reminiscent of the Epson FX80 – a printer renowned for jamming up – but I had no problems with the Panasonic. Paper parking goes all the way with this machine (on read feed). The paper winds out, and when you've finished with the single sheets, setting the lever back to tractor feed automatically winds the fanfold paper back in again.

There's also a neat trick where it winds continuous paper up a bit before you tear a sheet off, then winds it down again. This way you can tear within about half an inch of the perforation, so you don't waste a whole sheet of paper every time you print something.

This is the fastest of the three printers. It managed the test letter in 68 seconds in a crisp-looking NLQ face. If anything, using NLQ underemphasises the differences in speed, because the printer spends most of its time moving the head back and forth. In draft mode however, the Panasonic is way ahead of the other two, and the quality of the draft print is much better too.

There were no problems using standard software with this printer. My usual Epson printer driver for *View*, screendumps, and even the Archimedes' dot-matrix printer driver worked exactly as expected. This machine has a couple of extras that the other two don't have – notably downloadable NLQ characters and a selection of fonts (Courier, Prestige and Bold PS).

The control panel on the front can be used to select fonts – and it overrides any font selection in software. There's no 'macro' facility on the control panel, as there is with the more expensive KX-P1124, but that's a small loss.

In my opinion this printer offers far more facilities than either the Citizen or Mannesmann Tally models. With full paper parking, a choice of three fonts, better speed and a more robust feel, there's no doubt that it is the clear winner. If the price difference isn't too great, then this is the one to go for. It's currently on sale at just under £200; and at that price it's unbeatable value.

SOFTWARE

# DOS SOLUTIONS

**Dave Futcher tries to solve his DOS problems with Shibumi's package for the Master 512**

Judging from the sales, and now the great shortage of Acorn 512 co-processors, the final price cut to £99 must have made many BBC users realize that they could easily transform their model B or Master into a 16-bit IBM-PC compatible computer.

It can't be bad to have the best of 8-bit microcomputing, as well as access to well over 15,000 IBM-compatible software packages. This enormous software base offers just about every type of program – everything from CAD to games.

If you have a Master 512 or a co-processor (which is based on the 80186 chip) you will be aware of the high degree of compatibility with the IBM PC that this add-on achieves. The hardware and the version of DOS Plus developed especially for the Master 512 is rather good at emulating the MS-Dos operating system used on PCs. The PC Pointers article in the September 1988 issue of *Acorn User* gave an impressive compatibility listing. Versions of many of the famous packages like Lotus 1-2-3, *dBase* and *Logistix* run without any problems.

But people are never satisfied. For some time there have been 'patches' around that can fix problematic applications. One example was even supplied by Acorn on the 'Miscellaneous Disc', that comes with the 512 – VPP Loader which will get the *VP Planner* spreadsheet up and running.

One day in October 1988, two Portugese men named Rui Oliveira and Joquim Cavalho, arrived at *BBC Acorn User* to show their attempts to iron out the problems that prevented some PC packages running on their BBCs.

What a great program *Problem Solver* turned out to be. After further work on the program's code, they set up Shibumi Soft.

Shibumi's *Problem Solver* tackles a host of these problems. The hardware incompatibilities such as low level keyboard scanning and programmable interrupt speeds are sorted out. Those programs that appeared to run, but at times just displayed blank screens are made to operate. Even a few of the operating system bugs in DOS Plus 1.0 are sorted out. The package also emulates the missing PC keys that BBC model B users don't have.

What then is *Problem Solver*? Unlike the software patch technique for individual programs like *VP Planner*, *Problem Solver* is a resident program. Once loaded, operation is automatic. It works with all Acorn issues of the 80186 co-processor, and all the versions of DOS Plus. But it is not suitable for use with the Solidisk 'PC Plus' memory expansion unit that boosts the Acorn board from 512k to one megabyte of memory.

*Problem Solver* is loaded by typing in PS at the normal A> prompt. PS is actually a Batch file that checks which version of DOS you have and installs the matching version of *Problem Solver*.

A simple Autoexec.bat file is provided on the program disc that can be transferred to your DOS Plus boot disc. This then tells you to place the *Problem Solver* disc into drive A, and it automatically loads it for you. The package includes PS0 for Xios version 1.00, PS1 for version 1.01 and PS3 for version 1.3 of the 512 brand.



At the heart of *Problem Solver* is the 'hidden menu'. By pressing CTRL-Shift-Copy, a whole range of facilities became available from further key presses. There are six groups of commands that help with screen mode problems, key presses, program speeds, and program code.

If a number between 1 and 9 is pressed, the speed that the computer is operating at can be altered. The 80186 co-processor is very fast compared with the IBM PC, and a number of programs fail because of this. On the other hand there are a few in which the program's speed can be boosted too.

Some packages like *Sidekick*, which are known as memory resident packages, or TSR's, do cause considerable problems when used on the Acorn hardware. Some won't run at all, others do run but maybe just alone, or they can be made to run but end up corrupting themselves or even the other programs in memory. *Problem Solver* provides the R command to help. It will get a number of memory resident packages such as *Sidekick* working. Pressing N returns everything to normal again.

Screen display problems are taken care of with the M command. M is followed by a number in the range 0 to 6, to change the screen mode without clearing the screen. This can be particularly useful when you have got a program running in the wrong screen mode and the screen is pure garbage. Zero or 1 changes the mode to 40-columns text, 2 or 3 change to 80 columns, 4 or 5 to 320 by 200 graphics in 4 colours and 6 changes the mode to 640 by 200 graphics in mono.

Under normal circumstances, once DOS Plus has been loaded, the red function keys are set with some useful commands that make using the board and the operating system easier. I

wonder how many 512 users realise that? You can call up Gem by pressing f0, help is available from f1, and commands like Sdir, Show, Set, Copy, Ren, Del, Type and Cd are on the other keys.

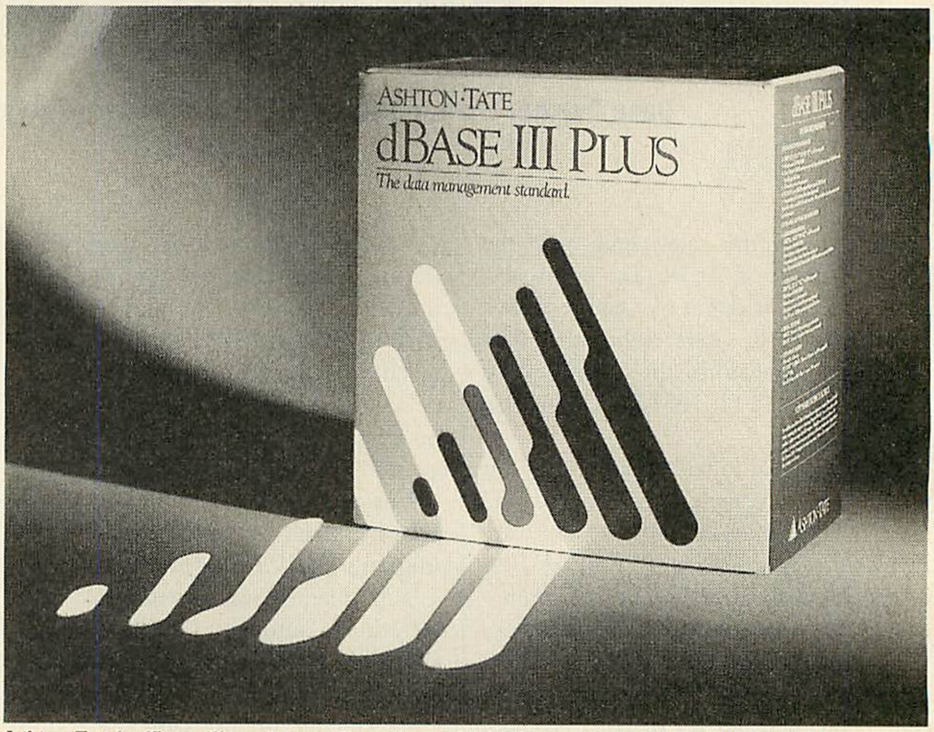
Master users should have no keyboard problems when using DOS Plus, as the numeric keypad has been programmed to give all the usual commands like Pg-up, Pg-down, Home, Ins, and Del. But the model B lacks the numeric keypad. This means that you are rather limited in your choice of software. But the ill-starred IBM PC Junior didn't have a numeric keypad either, so a few programs avoid the special keys deliberately.

Other companies like Programmable Systems Designs have already come up with a software solution that provides Ins, Del, Pg-up, Pg-down, Home, and End. The PSD method was sending your DOS Plus disc for special alteration by them, but *Problem Solver* offers the 'K' command.

When K is followed by either 3 or 2, two different sets of red key emulations are made available. K3 turns on the numeric keypad emulation, and K2 provides some extra keys. To help you to find what is where, a function key strip is provided. K1 returns everything to normal. Once K2 or 3 has been called all the DOS Plus commands disappear from the unshifted function keys. It's a shame that Shibumi was unable to retain these very useful functions.

The new keys definition would, at first glance, seem to be the answer for model B users. But some packages need all the red keys to access drop-down menus. *Forte*, the integrated package designed specially for education use, runs into terrible trouble with the *Problem Solver* K option. It's a great shame, as it's just the sort of package that teachers would want

| | Key Set 3 | | Key Set 2 |
|---|---|---|---|
| f0 | INSERT | f0 | INSERT |
| f1 | DELETE | f1 | END |
| f2 | + | f2 | DOWN ARROW |
| f3 | - | f3 | PG-DOWN |
| f4 | * | f4 | LEFT ARROW |
| f5 | / | f5 | |
| f6 | LEFT SHIFT | f6 | RIGHT ARROW |
| f7 | RIGHT SHIFT | f7 | HOME |
| f8 | SC-LOCK | f8 | UP ARROW |
| f9 | FUNCTION KEY 9 | f9 | PG-UP |



Ashton Tate's dBase III works on all versions of DOS Plus with Problem Solver's help

to run on a BBC with a 80186 board. You lose control of all the drop down menus. I found that K1 won't even return things back to normal. In fact, it makes things even worse – the speed of character entry becomes incredibly slow. I had to break out of the program and reload everything.

However, with lots of other packages it was fine. All three levels of the K command seem to work without any problems with the *Mindreader* shareware program (supplied with the Dabs Press 'Master 512 Shareware Collection'). Before *Problem Solver*, this great wordprocessor was impossible to use on a model B. But with the K command in operation, access to all the normal function key controls and Pg-down, Pg-up, Home and so on works fine.

*The Problem Solver* package also includes an additional utility that has not been incorporated into the menu system. It's called 'Visi+' and has to be installed after *Problem Solver* has been loaded.

Once resident in the computer's memory, it alters the CGA text screen emulation, and solves all sorts of problems with those infuriating programs that seem to run alright on the 512 board under DOS Plus but don't display anything on the screen.

## Conclusions

Although *Problem Solver* does have a lot to offer, I think it's a bit expensive at £25. However, if you have a program that you use at work on the office PC and you want to get it up and running on your model B or Master, it will seem worth it to you.

With *Problem Solver*, Ashton Tate's *dBase III* will work on all versions of DOS Plus. So too will the latest versions of *Turbo C* and *Turbo Prolog* from Borland. And if you want to play PC games, then you really will notice a difference.

If you have ever experienced problems with 512 software compatibility and really want to try to sort it out, *Problem Solver* could be the answer but don't expect the package to help with the real lost causes. It wasn't intended to! And it certainly won't.

Packages that use the serial port for comms or printing and plotting, or applications that write directly to the IBM PC's hardware will never run on your 80186 co-processor.

Problem Solver, *£25 from Shibumi Soft Ltd, R Prof Camara Sinval 138, 4100 PORTO, Portugal.* Shareware Collection *£25 from Dabs Press, 5 Victoria Lane, Whitefield, Manchester M25 6AL.*

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SOFTWARE

# PICTURE PERFECT?

**Sean Sollé watched Kathy Lewis at work with ProArtisan. He lets us know what he makes of the latest package from Clares**

It's more than four times the price of its forerunner. Is *ProArtisan* a sufficient improvement to justify its cost?

When Clares released *Artisan* over a year ago, it received very favourable reviews. It provided a better alternative to the *Paint* utility supplied free on the Arthur welcome disc.

It didn't take advantage of the Arc's 256 available colours, but it was easy to use, had a reasonable manual, and at less than £40, it couldn't be considered expensive especially if you compare it with Arc games that typically cost £20.

*ProArtisan* is £170. You receive a pretty box, a hefty 114-page manual, the system disc, and 'Resource disc one'. It's compatible with Risc OS, but doesn't multi-task. The manual is to Clares' usual high standards. It's nice to see that decent indexes are becoming less unusual in computer literature. Each manual is serial-numbered, and the program has a matching number encoded within it. This lets you register the package with Clares for upgrade and support purposes. It also means that Clares can trace illegal copies. Its policy is to leave Arc software unprotected. This is a good idea, because personal backups are simple to make, and putting the program onto your hard disc is quite painless.

The first part of the manual leads users over the usual hurdles of backups and booting, and says how to use the software from hard disc. You can also customise the start-up sequence – for example, which printer driver it defaults to. If you've used *Artisan* or almost any other Wimp-based art package, the first few pages of the manual plus the 'Quick guide' on page 17 give you almost all you need to start. You should only need to refer to the remainder of the manual occasionally. But new users are well treated too. Clear descriptions accompany an illustration of every icon and menu, and each new step has an associated exercise to try. The appendices include a set of advanced exercises which encourage you to explore *ProArtisan's* new facilities, plus details of the expansion options available.



Using the 'magic brush' you can alter up to 25 colours at once – on screen

PICTURES BY KATHY LEWIS

The resource disc isn't actually mentioned in the manual, causing me to suspect initially that it had been provided to show reviewers what can be achieved. It contains the pictures from the *ProArtisan* adverts, as well as the illustrations included in the manual.

After backing up the system disc, I soon discovered something else had been omitted from the manual. *ProArtisan* will not run on an A305. This caused major problems, and the pictures seen here had to be started using original *Artisan* with only 16 colours. They were converted to 256-colour as soon as a 1Mbyte machine was available. Fortunately, a mode 12 to mode 15 converter is supplied on the system disc. Like many of the *ProArtisan* utilities, it is a stand-alone command, and can be run from Basic as well.

Clares says that the trend among software houses is to no longer support the half-meg machine, especially with the advent of Risc OS. It's probably a good idea to upgrade to 1Mb as soon as possible, whether you intend to get *ProArtisan* or not. It certainly cuts down on the amount of reconfiguring and disc swapping. Once the software is loaded, it is incredibly easy to use. The whole screen is available for pictures, menus being called up by pressing the middle mouse button.

Press once, and a palette appears. This shows all of the Arc's 256 colours, neatly arrayed in graduated bands, and Select chooses the one required. Using the Adjust button allows a colour to be chosen from the screen picture instead.

Having so many colours on screen at once can be bewildering, and it is a shame that a mixing facility like the desktop 'Palette' utility isn't used instead – but in a 256-colour mode this isn't practical.

Pressing Menu a second time calls up the current menu. The top-level enables

any of seven sub-menus to be chosen, or allows you to leave *ProArtisan* and automatically restore the original machine configuration.

Menus only stay on the screen while the pointer is inside them. Some people find it disconcerting that they disappear so readily but it does avoid having to click on the close box all the time.

The first sub-menu is for drawing tools; it provides a spray-can, roller (for flood-fills), various pen-nibs (circular, triangular, user-defined etc), plus a zoom option for pixel editing.

The more interesting tools include Wash, which allows adjacent colours to be smeared into one-another, blurring sharp boundaries into a soft fade. A neat trick is to reduce the picture resolution by reducing, then re-enlarging the screen. By washing this 'blocky' picture, a splendid 'Monet-like' effect can be achieved. The Magic brush allows you to exchange colours on screen – up to 25 colours can be changed at once. This is especially useful if you've been using many shades of one colour and later change your mind.

The next sub-menu is Banding, this is for drawing area outlines as if with a rubber band. The Bezier curve option is very interesting; this starts life as a straight line, but it can be pushed and pulled at various points to form a smooth curve to follow almost any path. The Archimedes has to do some rather fancy mathematics to produce these curves, and it's a feature I'd expect to find in a CAD-type package instead of a paintbox one.

Spirites are well-integrated in *ProArtisan;* it's possible to load them from disc or grab them off the screen. Once defined, they can be used as brushes, scaled, saved to disc, or even used as ink for flood fills. The pixel editor also doubles as a sprite designer!

The Tools menu contains the all-important screen dump facility, for which there are no less then 19 printer drivers provided! Like the mode converter, they too can be used from Basic. Details are given on how to write a dump for unusual printers, should your machine not be catered for. Through the Tools menu, you can also adjust the mouse sensitivity, clear the screen, write text in a specified font, or type in a star command. A few intriguing items also appear here. Edge detection finds the perimeter of an object by comparing adjacent pixels within a banded area, and converts it to an outline shape. And there's an intriguing 'extension hook'. It allows you to define a rectangular area on screen, and pass the co-ordinates to a utility of your own, which can then alter that area. You could write your own picture manipulation routines and add them to *ProArtisan* in this way.

The penultimate sub-menu is Cut & Paste which lets you define a rectangular area, then move it about the screen, flip it vertically or horizontally, enlarge or reduce it in any direction, or even rotate it through any angle.

The disc filing menu allows screens, sprites, Beziers, fonts and magic pens all to be saved or loaded from disc. Actual screen files are heavily compressed, allowing up to about a dozen screens on one 800k disc, as opposed to four normal mode 15 pictures.

*ProArtisan* is quick, easy, and fun to use, absolutely brimming with clever features, and certainly makes good use of the facilities available on the Arc.

If you're serious about using your machine as an electronic paintbox, then this has to be the package, although as a seasoned Beeb-owner, I can't help thinking £169.95 is a lot of money for a piece of software. I would imagine the majority of potential customers will be paying a visit to their local dealer (and possibly the bank manager?) for a demonstration before buying!



**King's College, Cambridge: ProArtisan makes good use of the Arc's facilities**

## SECOND OPINION

The ability to use 256 colours, the overall speed and range of options are *ProArtisan*'s strengths. But there are also a host of annoying features.

On first impression, the menu system is pretty, but you still have to press several buttons to get something as simple as a fill. A straight forward fill is even more long-winded than a fancy 'progressional' one! And why does the palette and menu keep disappearing? You could have the choice between Go away and Sticky menus. And the menus are inconsistent. Some give you a good impression of the drawing you are using, but the Regular shapes menu shows a rectangle as the current tool, even if you're drawing circles!

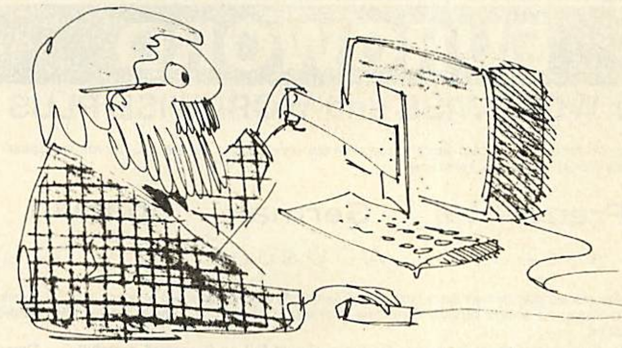
My major complaint lies in the terrible pixel editor. It comes up in what only looks like a moveable, scrollable window. The window is fixed at full screen size, so you can't see the area at normal size. Having to leave the pixel-editor, check what you've changed and then go back is not good.

There are many other annoyances in *ProArtisan*. Not least in the star command window – where typing *Cat corrupts your picture! *ProArtisan* could have been an excellent package, with lots of useful features. What you get is a richly-featured package. You can definitely draw nice pictures and do useful design work. But the 'user interface' to me is only just bearable.

# OFFERS

## DTP MANUAL

# Design for Desktop Publishing



The personal computer is used increasingly to produce documents intended for wide readership. Desktop publishing gives you a new ability to produce professional looking pages, but amateur, slapdash presentations just will not do. The finished documents must persuade, instruct or sell, and a professional designer is seldom at hand to guide the micro user.

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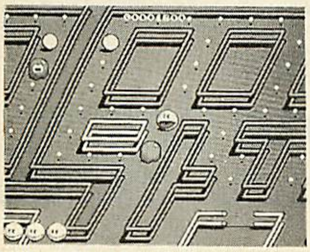
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# LETTERS

BBC Acorn User, 20-26 Brunswick Place, London N1 6DJ. BTG/TTNS 81:RED001

## PACLAND PLEA

Sir, After reading The Games Page (March '89), I was saddened to hear that Grandslam might not be producing any more games for the Archimedes. I have bought both of the games that it has



**Brilliant Grandslam Pacmania**

produced for the Archimedes and it must be said that I totally enjoyed them.

So when the company said that it would not be producing *Pacland* for the Arc I was very disappointed. *Pacland* is one of my all time favourite games and after having a BBC B for so many years I have never had the chance to experience such top quality games like these produced by Grandslam.

So please, Grandslam, if you continue bringing out the brilliant games then I'll certainly buy them!!

I also noticed that US Gold is bringing out a couple of games for the Arc. All I can say is I can't wait to get my hands on a copy of *Leaderboard.*

*R S Mansfield*
Margate

**An increasing number of companies are indeed showing an interest in developing and converting games and applications in the Arc, and it looks like there will be a steady stream of conversions from the arcades, and from both the ST and Amiga.**

## A WORD OF ADVICE

Sir, I wonder whether you or any of your readers could help me with two problems I have using *Interword.*

Firstly, when I use a heading on page one of any document it appears that embedded commands do not act upon it. I have attempted to include the embedded commands within the heading but they are not accepted.

Secondly, when using a screen display of 40, 53 or 106 characters I find that the default footing of the page number is still centred as for 80 character mode.

Have I missed something in the manual or does any other reader suffer from the same effects? Help is needed please . . . .

A marvellous magazine, keep up the good work.

**Mike Whiteman**
Lewisham

**Can anybody out there help Mr Whiteman?**

## DISTORTING THE TRUTH

Sir, My BBC model B runs perfectly well on my Luxor television/monitor. However, when my micro is connected to a television via the UHF socket, the display appears very distorted. Is this normal for a BBC micro?

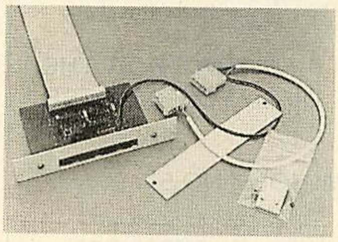
**L B Speer**
Maidenhead

**The colour output on the UHF socket is never as good as the RGB output you use for your monitor – that's the main reason why people prefer monitors.**

**However the picture shouldn't be distorted. The UHF modulator fitted inside the micro may be faulty, so get it checked by your local dealer.**

## DISC TO DISC DIFFICULTIES

Sir, I have a standard BBC model B and an Archimedes 310. How could I transfer software if I sold my Beeb?



**Beebug's disc transfer kit**

I have heard CJE Micros produce an Archimedes DFS disc reader. Would this be suitable if I use an external 5.25-inch disc drive?

**K Ladhani**
London

**Yes. You can attach an external 5.25-inch disc drive to the Archimedes, and there are a number of external drive interfaces for this – Watford, Beebug and CJE all make them. CJE's disc reader allows the Archimedes to read the 5.25-inch DFS discs which you use with your model B.**

**But this still won't allow you to transfer everything – only unprotected software will transfer without any trouble.**

## PAGING THE PROCESSOR

Sir, First let me congratulate you on an excellent publication. I have been reading *Acorn User* since 1984, and having saved every copy, I find it makes a very good reference library.

I have recently bought a 512 board for my Master 128. In my opinion, the current price makes it very good value for money. The main problem I have found with the board is not software compatibility, but the less than useful and uninformative manual.

I am sure that there must be lots of 512 users who would be pleased to see a page or two devoted to this product.

**E Battimiello**
East Sussex

**You're right – enough of them for publishers to be interested. Your best bet may be to get a copy of two forthcoming Master 512 books – the Dabs Press *User Guide* at £10 and the Dabs *Technical Reference Guide* for £15. They should be available now, through your local computer bookshop.**

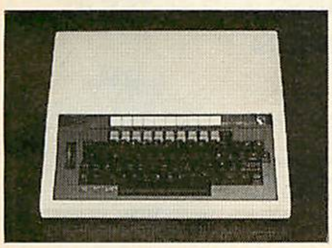
## DODGY CHARACTERS

Sir, My family owns a BBC Master Compact microcomputer. We have a lot of software, but unfortunately some will not work because the graphics characters 128 to 254 are not the same as a normal BBC Master 128.

We got our hands on a copy of the normal Master 128 welcome disc, but the convert program does not work on our Compact. Could you tell me a way to get normal characters?

**Brian Campbell**
Hamilton

**A BBC model B doesn't normally have any graphics characters between 128 and 255. A group of 32 of them can be defined with VDU 23 sequences.**



**Micro has undefined characters**

**But some programs, particularly games, poke the new definitions into memory directly rather than using VDU 23. It all goes wrong on a Master or Compact though – the characters are poked into memory in the wrong place. The Master 128 Convert utility corrects this, but doesn't work on a Compact and there isn't a Convert utility for this machine.**

**The May monthly disc contains a bonus program to define the graphics characters 128-255 so they are the same as a Master 128.**

## ADD-ON ADVANTAGES

Sir, What are the advantages (if any) of buying the 512 co-processor for my Master 128? I use my computer mainly for spreadsheet and database work, using Computer Concepts' *InterWord, InterSheet, InterChart* and *InterBase*, plus PMS' *Publisher, Super Art* and *Stop Press*.

What are the main features of the 512k, and how could they improve my use of the computer?

**G Winterman**
Pembrokeshire

**The 512 co-processor, which can be just plugged inside your Master, makes it into a (nearly) IBM PC compatible. If you use a spreadsheet or database on an IBM PC at work, then it's likely you could then bring work home with you. But if you don't need to use PC software, then what you've already got is adequate. The 512 board doesn't improve the graphics or speed up your micro.**

## REACHING HOME BASE

Sir, I have a B+ fitted with several of the Computer Concepts ROMs. I recently purchased *InterBase* and aside from the resident program found there is a little more to it than plugging it in and taking off.

I don't think I will find time to produce my own purpose-made software. I would be grateful if you could tell me if any back issues have covered this or point me in the right direction.

**Michael Bott**
Oxford

**All databases are relatively difficult to use. But the worst problem with *InterBase* was the manual. This has been rewritten and improved, to help people get more from the chip. If you're a registered *InterBase* owner, you can get the upgraded manual from Computer Concepts.**

**We have not published an article on using *InterBase* nor has a book on the subject been produced. However, with the help of the new manual you should be able to master the package.**

## PROBLEM PAGES

Sir, A diary. Late '85: *Acorn User* page numbers shrink to near invisibility. February '86: P G Browning leads the successful fight for readable numbers. January '88: ignoring opinions of the readers, numbers revert to a smaller size — in fact smaller than ever before. I hope this will soon be rectified.

**Fred Williams**
Staffs.

**Good comment. In fact it isn't a smaller size, just a different typeface that gives the impression of being smaller and lighter. From the June issue, we'll try and make them a bit easier to read.**

## FITTING THE FORMAT

Sir, I have just purchased a second hand BBC model B with DFS. My problem is that after buying unformatted discs, I have no knowledge of how to format them, either to 40 or 80 track. I would be grateful if you tell me how to go about it.

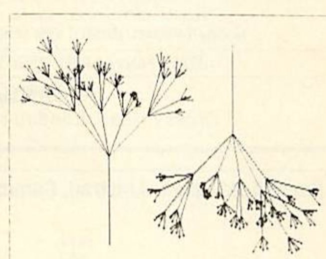
**J Gendle**
Bristol

**September 1984's *Acorn User* contained a program to format discs — you can't get this as a back issue, but if you send £1 with a letter to *BBC Acorn User* at 20-26 Brunswick Place, London N1 6DJ, we can provide a photocopy of the original article and listing. Or you could get a copy of a formatting disc from a friend with a disc drive – providing they also have a BBC model B, the program should work.**

## SCREEN DUMP SOLUTION

Sir, I must be one amongst many who are grateful to Michael Geller for his excellent high resolution screen dump (December 1988 *Acorn User*).

But some people with Taxan printers will find that although they diligently type



*FX6, each line will still get printed out on top of everything else. the simplest thing to do is to add:

```
1585 VDU 1,27,1,74,1,24
```

All is then well. The 24 gives a line feed of 24/216ths of an inch, to agree with line 1410.

**Richard Hiley**
Whitby

# 520ST-FM SUPER PACK




The Atari Super Pack is ideal for you if you want to get off to a flying start with the best in entertainment software. The Pack includes a 520ST-FM with ½Mb RAM, a built-in 1Mb disk drive, over £450 of top games and a joystick. If you buy the Super Pack at Silica Shop, we will add our own ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for details.

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**1Mb DISK DRIVE**
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|---|---|---|
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For the serious home user and the small business, we are pleased to announce a new package based around the 1040ST-FM. The 1040ST-FM has 1Mbyte RAM and a 1Mbyte built-in disk drive. In addition, the 1040ST-FM now comes with a TV modulator built-in. (The previously available 1040ST-F was designed for use with a monitor only and did not come with a modulator.) This modulator allows the 1040ST-F to be plugged directly into any domestic TV set, and comes complete with a lead to allow you to do so. The new 'Professional Pack' from Silica includes the new 1040ST-FM with modulator plus four high quality software packages including a spreadsheet, database, word processor and programming language. This 'Professional Pack' software will enable you to get straight down to business with your new computer. In addition to this software (worth £384.84), if you buy the Professional Pack from Silica Shop, you will also receive the Silica ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for further information.




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|---|---|
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# WHY SILICA SHOP?

Before you decide when to buy your new Atari ST computer, we suggest you consider very carefully WHERE you buy it. There are MANY companies who can offer you a computer, a few peripherals and the top ten selling titles. There are FEWER companies who can offer a wide range of products for your computer and expert advice and help when you need it. There is ONLY ONE company who can provide the largest range of Atari ST related products in the UK, a full time Atari ST specialist technical helpline and in-depth after sales support, including free newsletters and brochures delivered to your door for as long as you require after you purchase your computer. That one company is Silica Shop. We have been established in the home computer field for ten years with an annual turnover in excess of £8 million and can now claim to meet our customers requirements with an accuracy and understanding which is second to none. But don't just take our word for it. Complete and return the coupon below for our latest literature and begin to experience the Silica Shop specialist Atari service.

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ACUSR0589    DTP ☐

# ACORN USER ADVERTISEMENT PAGES – MAY 1989

AS SEEN ON TV

# ACORN AB USER'S

## DIARY

## Risc OS manual is printed backwards

***By Orson Fact***

Orson has at last received his very own copy of Risc OS, complete with the real ROMs and a printed manual – and well before the April target date too.

The manual was desktop published on a big 'professional' system (not the forthcoming Archimedes DTP package). However there has clearly been some problem.

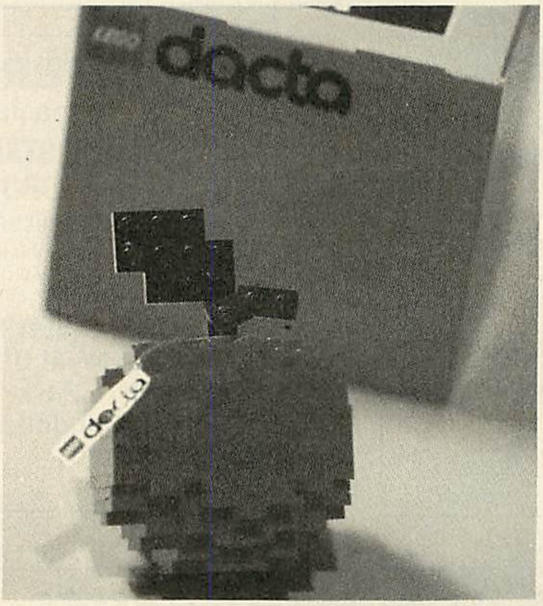
It's normal when printing books and magazines to have a page number at the foot of each page. It's also perfectly normal to put a dateline or chapter number there too, and to switch the two over on even and odd pages – check where the page numbers and dates appear in *BBC AU*. Notice that the numbers go on the outside of each sheet.

Acorn is the company that six years ago brought you *View*, which can handle this easily (check out the TS command). But can its 'professional' DTP system handle this?

Not as such. All the even page numbers are hidden in the fold in the middle of the book. Orson noticed this on page 325.

In fact, *View* can do a lot of things that more upmarket packages can't, like increasing the left margin on a right-hand page to allow for binding, counting words, and so on.

## Apple for the teacher




Orson Fact's wrath fell recently on the unsuspecting small town of Billund in faraway Denmark. Now, it is a well known fact that only three things come from Billund – Tjaereborg Holidays, Lego bricks and nothing else.

A lovely Lego gift, which was given to draw attention to the creation of a special 'Lego Dacta' range for schools, fell through the letterbox. Nice idea: an apple for the teacher. And beautifully executed too, even down to the stalk and a leaf.

However the idiots up at Legoland have superglued it all together, so the bricks can't be re-used. Orson had initially hoped that they could be rebuilt into an exact scale model of the Parthenon, as a lasting monument to the glory that was once ancient Greece.

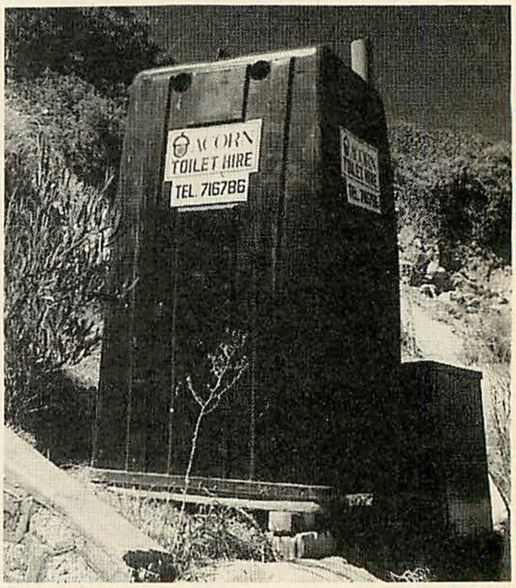
## Guru's gaffe

'Controversial industry guru' Bruise Smith is well known as one of the better halves of Dabs Press, desktop publishing journalist of the year, and ex-*Acorn User* technical editor.

He's clearly a man who's in touch with the market, a man who knows what's going on up in the bowels of Acorn, and a man who's privy to the innermost secrets of Cambridge. Is it possible that he knows something we don't about a cut-down version of the Archimedes? Perhaps.

Current Dabs ads feature details on forthcoming books and software for this cut-down machine – and they reveal it's to be called the 'Achimedes', or 'Ac' for short. Hmmm, perhaps not.

Knowing Bruise, perhaps it's just that the spelling checker he used doesn't have the word 'Archimedes'.




**Amid all the ill-informed speculation, *BBC Acorn User* exclusively reveals the latest from the Acorn skunk works – the ABM, or Acorn Bathing Machine. Apparently, it's a portable. More realistically perhaps, in the jargon of business computers, it's a 'luggable' – it requires mains water.**

## Welcome

This month, Abuser says welcome to the new editor of *BBC Acorn User* Geoff Bains, an old Beebug hack, takes the helm from big ed? Bell. Orson's only comment is, 'I like a man in a thick woolly suit'.

## Dressing up

Just a quick thank you to Superior's Richard and Steve Hanson for allowing the dressing of the current indecorous Barbarian 2 advertisement (look out for a review of the game next month). All we can say is 'Aciiied'.



Jet Fighter
£14.95



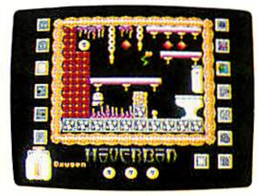
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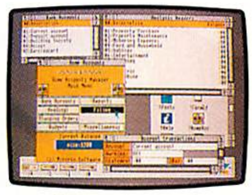
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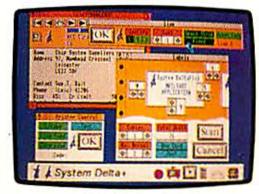
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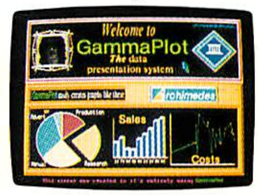
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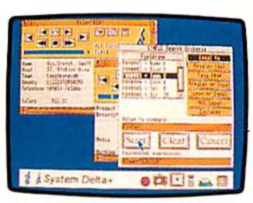
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Nominal Ledger (BBC)
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